New Partnership to Advance Autonomous Technology

Australian data innovation group, CSIRO's Data61, has partnered with Chinese company ZongMu Technology to tackle one of the biggest issues facing autonomous vehicles.

The partnership aims to find a way to give vehicles 'human' sight to better detect and analyse everything from road signs, traffic conditions, avoiding pedestrians, and collisions.

Data61 and ZongMu will work with each other from the research stage through to development, with the final product available to the company's customers in China and internationally including equipment manufacturers and partners in the mobility service industry.

The market for self-driving cars is rapidly growing and is expected to jump from US$42 billion in 2025 to nearly US$77 billion by 2035 as more organisations compete to create a truly autonomous car that can drive anywhere.

"Computer vision is the technology that allows autonomous vehicles to determine the difference between what is pavement and what is a driveable road," said Smart Vision System Group leader, Dr Nick Barnes.

http://www.primemovermag.com.au/news/article/new-partnership-to-advance-autonomous-technology

2018-02-09

QZS-3 and QZS-4 join the Quasi-Zenith Satellite System

In an effort to alleviate the GPS positioning problem in both urban and mountainous areas of Japan, the Japanese government has developed the Quasi-Zenith Satellite System (QZSS). A constellation of three inclined geosynchronous orbit (IGSO) satellites and one geostationary satellite transmits GPS-compatible signals to enhance positioning availability and accuracy. The IGSO satellites have repeating figure-eight ground tracks with the satellites spending most of their one-sidereal-day orbit, centred around apogee, over the Japanese archipelago. The satellites sequentially hover in the sky near the zenith for long periods of time. The satellites also provide both standard and advanced augmentation signals.

The first, or prototype, Block I QZSS satellite was launched in 2010 and, based on the positive test results from this satellite, an additional three satellites were launched in 2017, completing a four-satellite constellation. With the launch of two additional spacecraft in August and October 2017, the Japanese Quasi-Zenith Satellite System (QZSS) reached the

goal of a four-satellite constellation with the first fully-operational services expected to start in 2018. Aug. 19, 2017, marked the launch of QZS-3, the first geostationary Earth orbit (GEO) QZSS satellite, while the third spacecraft in inclined geosynchronous orbit (IGSO), QZS-4, was subsequently launched on Oct. 10, 2017.

Read more in *GPS World* article. http://gpsworld.com/innovation-qzs-3-and-qzs-4-join-the-quasi-zenith-satellite-system/?utm_source=gps_navigate&utm_medium=email&utm_campaign=gps_navigate_02202018&eid=376813635&bid=2010117

2018-02-09

Google Won the Last Maps War. Self-Driving Cars Give Other Mapmakers a Chance to Find Their Own Way

On any given day, there could be half a dozen autonomous cars mapping the same street corner in Silicon Valley. These cars, each from a different company, are all doing the same thing: building high-definition street maps, which may eventually serve as on-board navigation guides for driverless vehicles. These companies converge where the law and weather are welcoming — or where they can get the most attention. For example, a flock of mapping vehicles congregates every year in the vicinity of the CES technology trade show, a hot spot for self-driving advances. "There probably have been 50 companies that mapped Las Vegas simply to do a CES drive," said Chris McNally, an analyst with Evercore ISI. "It's such a waste of resources."

Autonomous cars require powerful sensors to see and advanced software to think. They especially need up-to-the-minute maps of every conceivable roadway to move. Whoever owns the most detailed and expansive version of these maps that vehicles read will own an asset that could be worth billions of dollars.

Which is how you get an all-out mapping war, with dozens of contenders entering into a dizzying array of alliances and burning tens of millions of investment dollars in pursuit of a massive payoff that could be years away. Alphabet Inc.'s Google emerged years ago as the winner in consumer digital maps, which human drivers use to evade rush-hour traffic or find a restaurant. Google won by blanketing the globe with its street-mapping cars and with

software expertise that couldn't be matched by navigation companies, automakers or even Apple Inc. Nobody wants to let Google win again. The companies working on maps for autonomous vehicles are taking two different approaches. One aims to create complete high-definition maps that will let the driverless cars of the future navigate all on their own; another creates maps piece by piece, using sensors in today's vehicles that will enable cars to gradually automate more and more parts of driving.
http://www.cetusnews.com/business/Google-won-the-last-maps-war--Self-driving-cars-give-other-mapmakers-a-chance-to-find-their-own-way.BJloJzuhwf.html
2018-02-22

500-vehicle C-ITS Trial Announced as iMOVE's First Research Project

iMOVE Cooperative Research Centre's first research project will be the safety evaluation and user perception study of Australia's largest on-road testing trial of cooperative vehicles and infrastructure. This is a $2.58 million, 3.5 year research partnership to help prepare for and accelerate the emergence of cooperative technologies onto Australian roads.
Delivered as part of an on-road field operational test (FOT) of a number of Cooperative Intelligent Transport Systems (C-ITS) safety applications, in and around Ipswich, Queensland. The project is being delivered by the Queensland Department of Transport and Main Roads with the Queensland University of Technology undertaking the safety evaluation research.

The C-ITS safety use-cases include vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) applications, with around 500 public and fleet vehicles retro fitted with C-ITS technologies, and roadside C-ITS devices installed on arterial and motorways. These devices enable vehicles to 'talk' to vehicles, infrastructure, road operations systems and cloud-based data sharing systems.

https://imovecrc.com/500-vehicle-c-its-trial-imove-first-research-project/?utm_source=feedburner&utm_medium=feed&utm_campaign=Feed%3A+iMOVECRC+%28iMOVE+CRC%29

2018-02-15

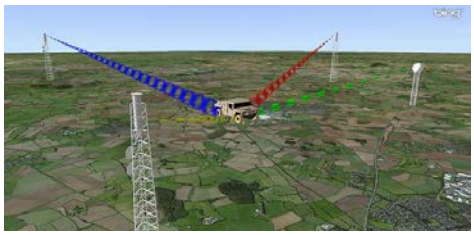
Signals of Opportunity: Holy Grail or a Waste of Time?

The military is always looking at new techniques and technology for deriving position and, it seems, every few years signals of opportunity (SOOP) becomes fashionable again. In broad terms, SOOP refers to the use of any signals for navigation, which are not normally intended for navigation. This might mean TV or radio broadcast signals, cellular network signals, or anything else you can receive.

In the quest for resilient positioning and navigation, SOOP certainly sounds attractive. When GPS goes down, why not simply continue to navigate by receiving digital TV signals instead? Why not receive a whole pile of different signals, and make yourself virtually immune to jamming? You can even turn jamming from a problem to a solution. If someone does decide to turn on a bunch of jammers, why not use the jammers themselves as signals of opportunity, and position yourself using those? With so many possibilities, it's no wonder SOOP excites people. Certainly it's of great interest to the military of many countries.

Read more in *GPS World* article. http://gpsworld.com/signals-of-opportunity-holy-grail-or-a-waste-of-time/?utm_source=gps_navigate&utm_medium=email&utm_campaign=gps_navigate_02202018&eid=376813635&bid=2010117

2018-02-14



5G, Cellular's Next Step, Brings New Positioning Capabilities

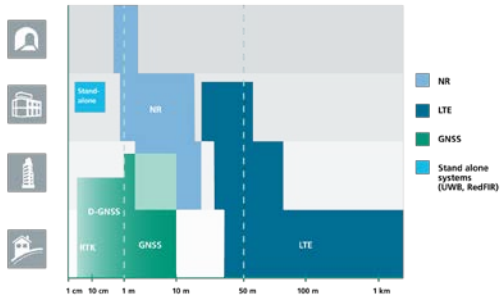
The cellular 5G standard has been designed to target latencies under one millisecond, data rates of up to ten gigabits per second, extremely high network reliability, and better accuracy in positioning. With location awareness becoming an essential feature of many new markets, positioning is consequently considered as an integral part of the system design of upcoming 5G mobile networks.

Its feet firmly planted in both the present and the future, the cellular industry is currently in the midst of implementation of Long Term Evolution (LTE)-Advanced, an evolution of what might be called plain old LTE, and a "true 4G" mobile broadband. Simultaneously, the industry is preparing the next step, as "there is a vastly increased need for a new mobile communications system with even further enhanced capabilities, namely a fifth generation (5G) system." 5G will process communication 10 times faster than 4G, according to experts. That's enough to download a 3D movie in 30 seconds. It would take six minutes on 4G.

What has all this got to do with GNSS? Well, aside from the precise positioning via cellular to be afforded by 5G, the two technologies share one prominent technique: adaptive array antennas for digital beam-forming. The PNT implications of 5G architectures are, principally, that efficient operation of directional links will require some level of knowledge of user location with regard to picocells. Picocells will have the ability to do direction-of-arrival positioning and ranging in order to maintain connectivity with user nodes. This can be exploited by the user node for positioning and location-based services, particularly for indoor and dense urban environments.

Read more in *GPS World* article. http://gpsworld.com/5g-cellulars-next-step-brings-new-positioning-capabilities/?utm_source=pro_oem&utm_medium=email&utm_campaign=pro_oem_02212018&eid=376813635&bid=2011616

2018-02-21



China Launches Another Pair of BeiDou-3 Satellites

China continues to update the BeiDou navigation satellite system. On Feb. 12, two more navigation and positioning satellites were launched into medium Earth orbits, following the successful launch of a pair of BeiDou satellites on Jan. 11. A Long

March 3B rocket with a Yuanzheng-1 upper stage lifted off from the Xichang Satellite Launch Center, Sichuan Province, at 05:03 UTC, according to gbtimes.com.

The newly launched pair are BeiDou-3 28 and 29. The satellites are part of a third phase of BeiDou deployment, which will take BeiDou coverage from regional to covering the countries along the Belt and Road initiative by the end of 2018, and globally by 2020.

According to Nasaspaceflight.com, the satellites are using a new bus featuring a phased array antenna for navigation signals and a laser retroreflector, with a launch mass of 1,014 kg. The accuracy, stability and signal strength of the BeiDou-3 satellites is improved over previous versions by developments in atomic clocks, laser communications and inter-satellite links.

Read more in *GPS World* article. http://gpsworld.com/china-launches-another-pair-of-beidou-3-satellites/?utm_source=gps_navigate&utm_medium=email&utm_campaign=gps_navigate_02132018&eid=376813635&bid=2003084

2018-02-12

Why Russia is One Step Ahead of US Army's Plans for Future GPS

The Pentagon and Israel's Defense Ministry have launched 'Urban Navigation Challenge', a startup competition to create advanced 'counter-terror' navigation systems which don't use GPS. The project makes no mention of officially designated US "rivals" like Russia or China, but according to Russian experts, it would make no difference even if it did.

The project, officially dubbed the Combating Terrorism Technology Startup Challenge (CTTSC3), includes over $200,000 in prizes for ideas using technology like radio beacons, preloaded electronic maps, step counters, and other solutions which do not require an uplink to the US military's GPS.

However, while GPS, in combination with traditional inertial guidance systems, allows for the accuracy of some US ammunition to reach as little as 1-2 metres from the target, experts

say that this effect is possible only in 'hothouse conditions', against an enemy which is much weaker.

Speaking to RIA Novosti, Aleksei Levchenkov, the director of TeKnol, a private technology firm specializing in the development and production of navigation systems for civilian application, explained that basically, "satellite guidance for high-precision weapons only allows one to conduct policing tasks."

"If there is resistance in the form of radio-electronic warfare systems, you can forget about satellites. In this case there are only two guidance methods - inertial or target illumination," the engineer stressed. The weak power of satellite signals, which can be muted or snuffed out even by compact, handheld jamming systems presently under development, makes the Pentagon's concern for finding alternatives fully justified, Saranov noted.

Read more in *GPS Daily* article.
http://www.gpsdaily.com/reports/Why_Russia_is_One_Step_Ahead_of_US_Armys_Plans_for_Next_Gen_Positioning_Systems_999.html
2018-02-12

US Air Force to Acquire New Jam-resistant GPS Satellites

The Pentagon plans to spend $2 billion over the next five years on a new constellation of GPS satellites that will be hardened to withstand electronic interference from hostile nations.

In a solicitation for bids posted Feb. 13, the Air Force Space and Missile Systems Center announced it will “conduct a full and open competition” for the production of 22 GPS-3 satellites starting in fiscal year 2019.

The Air Force already has ordered 10 GPS-3 satellites from Lockheed Martin Corp. The new program that is now getting underway is to acquire an improved version of the satellite, Air Force Secretary Heather Wilson told reporters on Tuesday 13 Feb.

“The GPS-3 that we are moving toward is more jam-resistant, and it is intended to be able to operate in a contested environment,” Wilson said.

A production contract to build GPS satellites is considered one of the most lucrative opportunities today in the military space world. A 22-vehicle deal could be worth as much as $10 billion. Lockheed Martin will likely be challenged by competitors like Boeing and Northrop Grumman.

Read more in *Space News* article. http://spacenews.com/air-force-to-acquire-new-jam-resistant-gps-satellites/

2018-02-13

Satelles Shows Improved PNT Accuracy from LEO Constellation

Satelles had demonstrated in 2016 sub-microsecond timing using its Satellite Time & Location (STL) service with a stand-alone TCXO-based receiver. The service uses a signal from the Iridium low-Earth orbit (LEO) constellation. Now the company has released from new tests using configurations with a differential source and with a more accurate OCXO clock, producing timing accuracy of 160 nanoseconds. Gregory Gutt, president and chief technical officer of Satelles, made the presentation at the recent Institute of Navigation International Technical Meeting. The 66-satellite Iridium LEO constellation transmits overlapping spot beams, which provide location-specific data that changes every few seconds.

Read more in *GPS World* article. http://gpsworld.com/satelles-shows-improved-pnt-accuracy-from-leo-constellation/?utm_source=gps_navigate&utm_medium=email&utm_campaign=gps_navigate_02132018&eid=376813635&bid=2003084

2018-02-13

Europe Claims 100 Million Users for Galileo Satnav System

The Galileo satellite navigation system, Europe's rival to the United States' GPS, has nearly 100 million users after its first year of operation, the French space agency CNES said Thursday 1 February. The system, seen as strategically important to Europe, went live in December 2016, having taken 17 years at more than triple the original budget to get there. Initial services offered only a weak signal, and some of the atomic timekeepers on the satellites failed while two satellites were placed in the wrong orbit.

But additional satellites have been added since, and by 2020 Galileo is supposed to offer much greater accuracy than GPS, pinpointing a location to within a metre, instead of several metres.
Apple's latest iPhones as well as Samsung devices are Galileo-compatible, as are cars and other connected objects.
CNES said airlines including Air France and Easyjet also plan to adopt the system.
The Galileo programme is funded and owned by the European Union, which no longer wants to rely on the military-owned competitors—GPS and Russia's GLONASS.
Starting this year all new cars sold in Europe will be fitted with Galileo for navigation and emergency calls.
https://phys.org/news/2018-02-europe-million-users-galileo-satnav.html?utm_content=buffere4b8f&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

2018-02-01

DoD Offers $110K in Startup Contest for GNSS-Denied Navigation Technologies

The U.S. Department of Defense (DoD) and Israel's Ministry of Defense are joining forces for the third time in setting up a startup competition to tap into new technologies to beat terrorism. More than $200,000 in prizes will be awarded to the most promising startups.

"As terrorists become ever more sophisticated, technological innovations become an increasingly critical component of detecting and defeating them," challenge organizers said.

The challenge is is divided into two tracks.

- The **Urban Navigation Technologies Challenge** focuses on navigating without GPS — an increasingly important issue for special forces, law enforcement and other anti-terrorism professionals who need to operate indoors or in environments where GPS is not available.

- The **General Technologies Challenge** includes surveillance, social media analytics, image and video, cybersecurity, drones, robotics, personal protection, biometrics, reconnaissance, and detection of explosives or water contamination.

Both tracks are open to all startups, entrepreneurs, and research groups worldwide, with a deadline of March 9. Entries will be reviewed by an international panel of judges from the DoD, Israel Defense and other organisations.

Read more in *GPS World* article. http://gpsworld.com/dod-offers-110k-in-startup-contest-for-gnss-denied-navigation-technologies/?utm_source=gps_navigate&utm_medium=email&utm_campaign=gps_navigate_02062018&eid=376813635&bid=1996064

2018-02-05

New Report Recommends British GNSS Protections, Efforts May Soon Surpass Those in U.S.

Experts who studied GNSS vulnerabilities for the British government recommended GNSS receiver standards, the possible banning of jammers and the establishment of a terrestrial backup in case satellite navigation is disrupted. Their January 30 report *Satellite-derived Time and Position: A Study of Critical Dependencies*, looks sector by sector at how signals from global satellite navigation systems have become integrated into the United Kingdom's essential underpinnings.

"The purpose of this report," wrote the study's 16-person panel, "is to lay out the breadth, scale and implications of our reliance on GNSS. It examines this reliance mainly in terms of existing critical national infrastructure (CNI) but also considers future digitally-based infrastructure - such as 5G, electricity system management, autonomous vehicles and the Internet of Things - and other non-critical applications, which GNSS will continue to enable."

The study found that half a dozen sectors - telecommunications, emergency services, energy, finance, food and transportation - were dependent or were becoming dependent in some way on GNSS signals for getting precise time, position or both.

Read more in *Inside GNSS* article. http://www.insidegnss.com/node/5790
2018-01-31

CSIRO Autonomous Car Breakthrough: Bionic Eye Tech Could Help Future Cars 'See'
Australian technology used in bionic eyes — that improve sight for humans with vision impairment — could be the breakthrough that enables autonomous cars of the future to detect tricky traffic situations, the CSIRO claims.

The CSIRO's Data 61 division is working with a technology company that supplies Chinese car makers to adapt its bionic eye know-how to help navigate dangers on the road.

As car makers around the world roll out their autonomous tech, most are starting with "on-ramp to off-ramp" freeway automation, because there are fewer obstacles to detect. Most vehicles are travelling at a similar speed, the lane markings are typically good, and there are no pedestrians.

The bigger challenge for autonomous cars is reading traffic signals, stop signs, pedestrians and cyclists and other random obstacles in cities and suburbs.

The CSIRO's Data 61 division is working with China's ZongMu Technology to equip vehicles with computer vision "to allow a machine to see and understand the environment the way humans do, and react to hazards".

http://www.heraldsun.com.au/motoring/hitech/csiro-autonomous-car-breakthrough-bionic-eye-tech-could-help-future-cars-see/news-story/77113d978686930c18384406154bbe63?csp=879dba59bfa50ae0894b534f45e975b0

2018-02-05

Available Now: White Paper on using GNSS Raw Measurements on Android devices

A newly published White Paper provides developers with in-depth information on accessing and using GNSS raw measurements with Android, to implement advanced GNSS techniques in mass-market devices.

Google's announcement that GNSS raw measurements would be made available from Android 7.0 devices (i.e., Nougat) marked the first-time developers had access to carrier and code measurements and decoded navigation messages from a mass-market device.

The advantages of using these measurements are many. For instance, developers can use this information to implement advanced GNSS techniques in mass-market devices and to compute a position using selected satellites/constellations, optimizing the use of Galileo. When combined with external sensors, raw measurements increase the time when position, velocity and time (PVT) can be computed. More so, Receiver Autonomous Integrity Monitoring provides another layer of integrity in mass-market devices using raw measurements.

"We believe these raw measurements are a real game changer, re-defining the GNSS on our smartphones," says Lukasz Bonenberg from the University of Nottingham and a member of the GSA's GNSS Raw Measurements Task Force. "Not only does it allow us to work directly with GNSS data – for post-processing, testing and teaching – but also to find new ways of using GNSS on smartphones, which will lead to new applications that add value to smartphone-based services."

Despite these advantages, the use of GNSS raw measurements remains limited to testing by GNSS experts. In fact, there are only a handful of smartphone apps that currently use raw measurements. This is, in part, due to the fact that Java coders are usually not GNSS experts, meaning they need help understanding Android raw measurements. Furthermore, the GNSS community typically works with standard formats, such as RINEX and NMEA. As neither of these are available for an Android platform, developers must learn new, non-standard formats.

https://www.gsa.europa.eu/newsroom/news/available-now-white-paper-using-gnss-raw-measurements-android-devices

2018-01-16

More Interference Potential from Another Tower Set

Satellite operator Iridium asked the Federal Communications Commission (FCC) in April 2017 to modify its licence to add a new class of ground stations called Certus for expanded terrestrial, maritime and aeronautical operations.

Iridium's 66-satellite constellation provides, in addition to mobile communications signals, the Satelles time and location service: microsecond timing accuracy and 20- to 50-metre unaided position accuracy worldwide.

The GPS Innovation Alliance (GPSIA) commented in September, "GPSIA seeks to ensure that radio navigation satellite service (RNSS) receivers operating in the 1559–1610 MHz band are adequately protected from out-of-band emissions (OOBE) generated from the new Certus mobile Earth station (MES) terminals that will operate on the second-generation Iridium satellite system.

Read more in *GPS World* article. http://gpsworld.com/more-interference-potential-from-another-tower-set/?utm_source=navigate&utm_medium=email&utm_campaign=gps_navigate_01302018&eid=376813635&bid=1989416

2018-01-29

Australian Learns How Strava Heat Map Reveals Dangerous Information from Jogging US Soldiers

An interactive map posted on the internet that shows the whereabouts of people who use fitness devices such as Fitbit also reveals highly sensitive information about the location and activities of soldiers at US military bases, in what appears to be a major security oversight. The Global Heat Map, published by the GPS tracking company Strava, uses satellite information to map the location and movements of subscribers to the company's fitness service over a two-year period by illuminating areas of activity.

Strava says it has 27 million users around the world, including people who own widely available fitness devices such as Fitbit, Jawbone and Vitofit, as well as people who subscribe directly to its mobile phone application. The map is not live - rather it shows a pattern of accumulated activity between 2015 and September last year. Most parts of the United States and Europe, where millions of people use some form of fitness tracker, show up on the map as a blaze of light, because there is so much activity.

But in war zones and deserts such as Iraq and Syria, the heat map becomes almost entirely dark - except for a few scattered pinpricks of activity. Zooming in on those brings into focus the locations and outlines of known US military bases, as well as of other unknown and potentially sensitive sites - presumably because US soldiers and other personnel are using fitness trackers as they move around.

http://www.smh.com.au/technology/sci-tech/australian-learns-how-strava-heat-map-reveals-dangerous-information-from-jogging-us-soldiers-20180128-h0pg5i.html

2018-01-29

S. Korea to Build 'Korean Positioning System' by Putting Up Seven GPS Satellites

Korean technology and capital will build its own global positioning system (GPS) which Korea has used by fully depending on advanced countries such as the United States. The Ministry of Science and ICT is planning to finalize the third space development promotion plan including the construction of the ‘Korean Positioning System’ (KPS) at a Space Committee meeting scheduled to be held on February 5.

According to the Ministry of Science and ICT, the Korean Positioning System (KPS) will be launched in 2034 after the development of a ground test site three years from now in 2021, the development of core satellite navigation technology in 2022 and the development of satellite navigation mounting development in 2024. A total of seven navigation satellites including three geostationary ones will be launched and operated for the construction of the KPS. The ministry is planning to provide overseas navigation satellites' complementing and unique signals to a 1,000km radius of Seoul. It is estimated that it will cost about 2.5 trillion won to build seven KPS satellites.

According to the Korea Aerospace Research Institute and industry source, at least four satellites must be in the orbit to use GPS services. In addition, the GPS needs at least 24 satellites to cover the entire globe. Now that Korea needs a local positioning system with a radius of 1,000km of Seoul, only seven satellites are required according to the research institute.

http://businesskorea.co.kr/english/news/ict/20414-gps-independence-s-korea-build-korean-positioning-system-putting-seven-gps-satellites

2018-01-31

ESA Selects Airbus for SBAS Using Both GPS and Galileo

EGNOS V3 will offer improved and secure Civil Aviation Safety of Life services for the next decade over Europe. The program will ensure a full continuity of service and will be the first operational SBAS using both GPS and Galileo.

Airbus has been selected by the European Space Agency (ESA) as the prime contractor to develop EGNOS V3, the next generation of the European Satellite Based Augmentation System (SBAS) planned to provide the civil aviation community with advanced safety-of-life services and new services to maritime and land users.

Developed by ESA on behalf of the European Commission and the European GNSS Agency (GSA), EGNOS V3 (European Geostationary Navigation Overlay Service) will provide augmented operational safety-of-life services over Europe that improve the accuracy and availability of user positioning services from existing GNSS (Galileo and GPS).

EGNOS also provides crucial integrity messages to EGNOS users with alerts within a few seconds in case of system degradation, consolidating EGNOS' position as one of the leading edge GNSS systems in the future. Besides improved safety-of-life services, EGNOS V3 will improve robustness against increasing security risk, in particular cyber-security risks. EGNOS V3 will ensure a full continuity of service for the next decade and will be the first operational SBAS implementing the dual-frequency and multi-constellation world standard, with both GPS and Galileo, replacing EGNOS V2 which has been in operation since 2011.

Read more in *GPS World* article. http://gpsworld.com/esa-selects-airbus-for-sbas-using-both-gps-and-galileo/?utm_source=navigate&utm_medium=email&utm_campaign=gps_navigate_01302018&eid=376813635&bid=1989416

2018-01-29