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# SatNavNews

FAA Navigation Programs AJM-32



<http://gps.faa.gov>

The *SatNav News* is produced by the Navigation Programs AJM-32 branch of the Federal Aviation Administration (FAA). This newsletter provides information on the Global Positioning System (GPS), the Wide Area Augmentation System (WAAS) and the Ground Based Augmentation System (GBAS).

## 29th Interoperability Working Group (IWG) Meeting

### Focus: Dual-Frequency Multiple Constellation SBAS Service

Satellite Based Augmentation System (SBAS) providers met for the 29th time in Arlington, VA on October 21-22, 2015. The SBAS Interoperability Working Group (IWG) is a forum for SBAS providers to address issues related to the interoperability of SBAS systems, with a goal of providing seamless operations for users. Meeting topics included SBAS status and future plans; implementation and interoperability issues; and utilization. The focus of the IWG-29 was on the continued definition of a future Dual-Frequency Multiple Constellation (DFMC) SBAS service. Availability of the service requires additional dual-frequency ranging source from the four core constellations (GPS, Galileo, GLONASS and BeiDou), user equipment compliant with an RTCA Minimum Operational Performance Specification, and service provisioning from SBAS systems. IWG 29 was held in Arlington, VA the same week as RTCA Special Committee 159 working on satellite navigation standards, providing the opportunity for IWG participants to also attend the RTCA meeting.

The major focus of IWG 29 was continued development of the DFMC SBAS concept. Since IWG-28 in April, two documents were completed. The DFMC SBAS Definition Document, which provides a high-level description of the DFMC SBAS concept developed in collaboration in the IWG, and



**29th Interoperability Working Group**

Arlington, Virginia  
October 21-22, 2015

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### Tell Us Your WAAS Story

We're collecting testimonials about the benefits of Wide Area Augmentation System (WAAS) navigation from users. If you are a pilot, passenger, airport manager, controller, dispatcher, airline employee, or are involved in aviation in any capacity - whether you fly fixed-wing or vertical flight aircraft - we want to hear from you! Please send your stories and contact information to Amy Trevisan at: [amy.ctr.trevisan@faa.gov](mailto:amy.ctr.trevisan@faa.gov)



the DFMC SBAS Interface Control Document. Both documents were provided to RTCA and EUROCAE to enable equipment and aircraft manufacturers time to review these documents and provide comments. The IWG plans to revise these documents in February in response to these comments.

The IWG also discussed topics related to SBAS that were previously briefed at the International Civil Aviation Organization (ICAO) Navigation Systems Panel. These topics included the current and potential future range of pseudorandom noise codes (PRNs) available for use with SBAS and the concept of operations for use and approval of satellite navigation using additional frequencies and constellations. The IWG will provide input to this ICAO activity based on work to define DFMC SBAS.

Several organizations provided updates on their plans for SBAS. The IWG heard from the Japanese on plans to transition the broadcast of SBAS from MTSAT to QZSS. China provided information on their newest Middle Earth Orbit satellites and plans for deployment of ICAO-compliant SBAS. EGNOS-Africa provided a status of SBAS planning in Africa. Continued coordination at IWG will help foster the expansion of SBAS and provide a forum to address issues that emerge as more entities develop SBAS.

- Joseph Dennis, FAA AJM-32/NAVTAC

## GBAS Remains Operational During Winter Storm Jonas



Ground Based Augmentation System (GBAS) remained operational at Newark International Airport during winter storm Jonas. Newark and surrounding airports (Kennedy and LaGuardia) ILS systems were out of service for high snow conditions; however, the Newark GBAS remained operational throughout the snowstorm.

CAT I GBAS operations are now standard operations at Newark and Houston airports. As of December 2015 a total of 2,394 GLS approaches had been conducted at Newark, NJ and Houston, TX by United Airlines, Delta Air Lines and international airlines (Lufthansa, Cathay Pacific, British Airways, and Emirate Airlines). GLS equipage grows with the implementation of new Boeing and Airbus aircraft capable of GLS approaches.

The GBAS program achieved a milestone in October 2015 with the approval of an important modification (Block II update) of the previously approved GBAS CAT I system (Honeywell SLS-4000 Block I) configuration. This modification will enhance system availability through an updated signal deformation monitoring algorithm and more efficient multipath masking techniques. An option to leverage use of WAAS real-time ionospheric monitoring was also approved as part of this block update; this option may provide a path to approving autoland capabilities.

The primary focus of the FAA GBAS program for the past year has been validation of the ICAO Standards and Recommended Practices (SARPS) for GBAS Approach Service Type D (GAST-D) requirements. GBAS GAST-D supports Cat II/III approach and landing operations. The ICAO target date for final SARPS review and acceptance is planned for Summer 2016.

In parallel to the final ICAO requirements validation efforts the FAA and Honeywell have started the system design approval (SDA) process for the Honeywell SLS-5000 system, which will be Honeywell's GAST-D capable GBAS system. The kickoff meeting was held at Honeywell's Coon Rapids, MN facility in January 2016. The SLS-4000 Block II design approval will serve as the GAST-D design baseline with the GAST-D ICAO SARPS as the approval basis. Work done under the FAA's GAST-D prototyping contract with Honeywell which ended in May 2015 will contribute to the total SDA effort.

The next International GBAS Working Group (IGWG) will be hosted by the Norwegian Service Provider in Oslo, Norway April 18-21, 2016. The IGWG is chaired by FAA and EUROCONTROL with over 100 participants from twelve nations, international service providers, industry, airlines and aircraft manufacturers attend the meeting and working sessions, which focus on GBAS development and implementation activities.

- Dieter Guenter, FAA AJM-32/NAVTAC

## Are You Seeing 2020?



As we fast approach the ADS-B 2020 mandate date, you might be wondering how the Wide Area Augmentation System (WAAS) fits into the picture and what your choices are. Many operators are starting to comply with the mandate, but that does not stop the questions from popping up along the way.

As of January 1, 2016 United States general aviation equipage for ADS-B Out had reached 16,056. There are various ADS-B avionics choices available that use WAAS as the position source. This might lead one to ask if there is a transponder/transceiver out there that can do more than just satisfy the ADS-B Out requirement. Several manufacturers have products that will not only meet the 2020 mandate for ADS-B Out, but will also use WAAS as the navigation position source that enables en route area navigation as well as your ability to fly RNAV (GPS) approaches to LPV minima. The FAA has a comprehensive web site to help guide you to the right choice. With over 4,100 WAAS LPV/LP approaches already available across the United States, there might be an ADS-B solution that would not only have you ADS-B Out 2020 compliant, but also seeing "20/20" to these approaches.

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*As of January 1, 2016, United States General aviation equipage for ADS-B Out had reached 16,056*

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Whatever the case, follow these links to help you find your best solution and see your way to 2020!

[www.faa.gov/go/equipadsb](http://www.faa.gov/go/equipadsb) and <http://www.aopa.org/Pilot-Resources/Aircraft-Ownership/Technology/ADS-B>

- Amy Trevisan/Dave Kerr, FAA AJM-32/NAVTAC

## WAAS Team Supports Rollout of NextGen Exhibit at ATCA

The new FAA NextGen exhibit, the NextGen Gate-to-Gate Pavilion, took center stage at the 60th Annual ATCA Conference and Exposition, November 1-4 at the Gaylord National Resort and Convention Center in National Harbor, MD. The exhibit was designed to illuminate the far reach of NextGen initiatives and how they impact every phase of flight.

The WAAS team supported the exhibit by engaging attendees in conversation, answering questions and introducing them to the Magic Map tool. Demonstrations using the Magic Map not only answered many National Airspace System (NAS) and NextGen questions but enlightened NAS stakeholders by showing a clear, tailored picture of the scope of NextGen while providing an up-to-date status of NextGen programs, capabilities, and roadmap forward.

WAAS is one of the foundational NextGen programs, and its current status can be easily accessed from the user-friendly Magic Map legend. WAAS history, design, coverage, available procedures, aircraft equipage, and other useful material are just a "magic" click away. This tool allows all the players to input their program status easily and have current information available expeditiously.

The team members had a great time showing off the Magic Map tool to attendees and the many benefits of WAAS over the 3 day conference. They particularly enjoyed explaining WAAS and the ever-growing list of RNAV (GPS) approaches with LPV minima especially since they now triple the number of ILS Category 1 procedures. As of January 7, 2016, there were 3,613 Wide Area Augmentation System (WAAS) Localizer Performance with Vertical guidance (LPV) approach procedures vs. 1,280 CAT I ILS approaches.

- Dave Kerr, FAA AJM-32/NAVTAC



## Satellite Navigation Approach Procedures Update

The tables shown here reflect the continuing growth of satellite-based approach procedures as compared to the inventory of instrument approach procedures based on conventional NAVAIDs. For more detailed information about satellite-based instrument approach procedures, please visit our GPS/WAAS Approach Procedures web page. [http://www.faa.gov/about/office\\_org/headquarters\\_offices/ato/service\\_units/techops/navservices/gnss/approaches/index.cfm](http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/navservices/gnss/approaches/index.cfm)

Satellite-based Approach Procedures			
	Procedures (Part 139 Airports)	Procedures (Non-Part 139 Airports)	Total Number of Procedures
<b>RNAV (GPS) Approach LNAV Line of Minima</b>	1,774	4,264	6,038
<b>RNAV (GPS) Approach LNAV/VNAV Line of Minima</b>	1,391	2,097	3,488
<b>RNAV (GPS) Approach LPV Line of Minima</b>	1,395	2,218	3,613
Non-ILS runway	48	1,639	1,687
ILS runway	1,347	579	1,926
<b>RNAV (GPS) Approach LPVs w/200' HAT</b>			942
<b>RNAV (GPS) Approach LP Line of Minima</b>	83	523	606
<b>GPS Approach GPS Stand-Alone Procedures</b>	10	89	99
<b>GLS Approach</b>	11	0	11

(Data as of January 7, 2016)

Instrument Approach Procedures (IAPs) Based on Conventional NAVAIDs	
ILS	1,280
ILS (CAT II)	154
ILS (CAT III)	119
LOC	1,430
NDB	664
VOR	1,216

(Data as of December 10, 2015)

More information is available on the FAA Inventory Flight Procedures (IFP) Inventory Summary at [https://www.faa.gov/air\\_traffic/flight\\_info/aeronav/procedures/ifp\\_inventory\\_summary/](https://www.faa.gov/air_traffic/flight_info/aeronav/procedures/ifp_inventory_summary/)

The number of LPVs in Europe is also growing. The table to the right shows LPV procedures in Europe as of December 10, 2015, as included in the Quarter 4 EGNOS Bulletin. (Source: EGNOS Bulletin, Issue 17 Q4 2015)

Follow this link to the most recent Quarter 4 EGNOS Bulletin, Issue 17: [http://egnos-user-support.essp-sas.eu/new\\_egnos\\_ops/content/quarterly-bulletin](http://egnos-user-support.essp-sas.eu/new_egnos_ops/content/quarterly-bulletin)

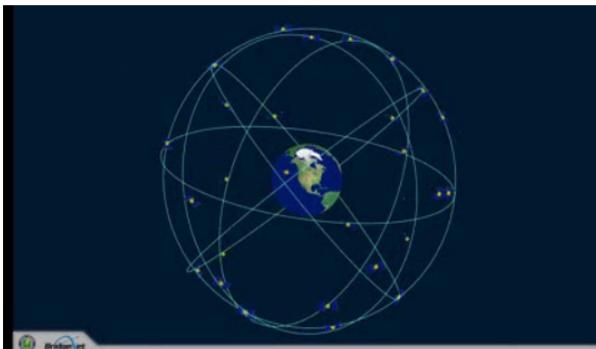
### On the Web

Where can you find FAA Satellite Navigation program information between editions of the SATNAV News? On our website, at <http://gps.faa.gov>, you can read about GPS, WAAS, and GBAS; browse an archive of past SATNAV News editions; and download a variety of fact sheets.

Country	Airports – LPV procedures	# LPV Procedures
Austria	2	2
Belgium	1	1
Croatia	1	1
Czech Republic	4	8
Denmark	3	6
Finland	1	2
France	75	119
Germany	21	35
Guernsey	1	2
Italy	7	15
Netherlands	2	3
Norway	10	20
Poland	2	4
Portugal	1	2
Slovak Republic	2	4
Spain	1	2
Sweden	2	3
Switzerland	8	10
United Kingdom	2	4
<b>Total</b>	<b>146</b>	<b>243</b>

Three-dimensional animations have been added to our “GPS - How It Works” web page and to our “WAAS - How It Works” web page. Please visit our website at <http://gps.faa.gov> to learn more.

- Mary Ann Davis, FAA AJM-321/NAVTAC Joseph Dennis, FAA AJM-32/NAVTAC



## New EGNOS Service Declared at the EGNOS Service Provision Workshop 2015 in Copenhagen EGNOS LPV-200 Service Declaration



The new EGNOS LPV-200 (Localizer Performance with Vertical guidance) service level now enables aircraft approaches that

are operationally equivalent to ILS CAT I: providing lateral and angular vertical guidance

without the need for visual contact with the ground until a Decision Height (DH) of down to only 200 ft. above the runway. These EGNOS-based approaches are considered ILS look-alike, but without the need for the expensive ground infrastructure required for ILS.

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*EGNOS LPV-200 is now the most cost effective and safest solution for airports*

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EGNOS LPV-200 based approaches, lowered from LPV-250, guarantee all the advantages provided by an ILS CAT I approach with the airspace design flexibility of a PBN approach. Benefits include:

- Reduced risks associated with landing in bad weather conditions
- Increased accessibility to airports
- Reduced delays, diversions and cancellations (cutting costs)
- Increased airspace capacity and reduction of both ATC and pilot workload
- Improved efficiency of operations, lowering fuel consumption, CO<sub>2</sub> emissions and decreasing aviation's environmental impact

This new EGNOS Safety of Life (SoL) service level is available free of charge to all European users within the service coverage area. EGNOS LPV-200 supports civil aviation operations during approaches to airports and helipads. The service requires no upgrade to an airport's ground infrastructure or to existing certified EGNOS receivers.

"EGNOS LPV-200 is now the most cost effective and safest solution for airports," said GSA Executive Director, Carlo des Dorides. "This is another big step forward for European satellite navigation and aviation."

LPV-200 is a key milestone in the development of European Satellite Navigation and EGNOS, Europe's SBAS, which has provided civil aviation-certified GPS augmentation over Europe since 2011. Today over 150 European Airports use EGNOS and it is estimated that by 2018 the number will increase to 440.

EGNOS is managed by the GSA, on behalf of the European Commission. ESSP SAS is the EGNOS Service Provider, under contract with the GSA.

*(reprint from [http://www.essp-sas.eu/news#news\\_119](http://www.essp-sas.eu/news#news_119))*

