Col. Steven Whitney

New GPS Director Brings Tech, Space Program Background

Dee Ann Divis

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ith experience in satellite procurement, user equipment development, and working with Congress, Col. Steven Whitney may be just the chief the GPS Directorate needs.

The GPS program was already facing challenges when Whitney became director of the GPS Directorate in early July. The GPS III program had slipped from its original schedule and the Air Force was in the midst of an unusual search for possible new contractors. Then in September a highly critical report from the Government Accountability Office put the long-delayed ground control system and the user equipment program under fresh scrutiny.

Whitney however, brings to the job a wide range of space-related and make-it-work program experience that should help the Directorate manage these challenges.

Col. Steven Whitney, GPS Directorate

For Adjacent Band Compatibility Assessment

DoT Seeks Faster GNSS Receiver Testing

Dee Ann Divis

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eederal officials have released a draft of their plan to determine the amount of interference satellite navigation receivers can tolerate from users in neighboring frequencies. The tests, proposed after the Federal Communications Commission (FCC) froze a controversial wireless broadband system, would accelerate research on GNSS receivers that process signals from multiple satellite constellations.

The release of the draft plan for the Department of Transportation (DoT) Adjacent Band Compatibility (ABC) Assessment by the Office of the Assistant Secretary for Research and Technology comes more than four months after a June workshop was delayed because the plan was not ready.

According to the current ABC timeline, that workshop will be held in Washington, D.C., October 2, before the end of the 30-day comment period for the plan, said a DoT spokesperson.

ABC Study continued on page 7

Liftoff of Soyuz ST-B flight VS12 carrying two Galileo satellites from Europe’s Spaceport in French Guiana. Two further Galileo satellites are scheduled for launch by end of this year. See article in tomorrow’s Show Daily.
GPS Networking, Inc. has specialized for 20 years, in providing global positioning products and solutions to enable you to effectively distribute the GPS/GNSS signal throughout your facility. We have customized solutions for providing the GPS/GNSS equipment for virtually every type of environment and application. GPS Networking solutions include GPS/GNSS DAS networks throughout the Major wireless carriers locations including base station applications, integral in the wireless rollout. We also have designed and developed networks which include re-radiating GPS/GNSS in Military Vehicles and countless defense applications. If you need information on how to accomplish your particular GPS/GNSS Network objective, please call us at 1-800-463-3063 and let us put our skills and experience to work for you.

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Whitney continued from page 1

engineer with three masters degrees — one each in systems engineering, national security strategy and administrative sciences — he has been part of a host of essential military space programs over his career.

Whitney worked on the Defense Support Program spacecraft where he was crew commander and chief for engineering and then served as chief of the Commanders Action Group for DSP’s replacement, the Space-Based Infrared System (SBIRS). While on the SBIRS program he had responsibility for the Flight Demonstration System as operations manager. He then spent four years at the Air Force Communications Support Facility at the White Sands Missile Range where he was the senior flight commander, chief of the Production Division and director of engineering. He also served at the National Reconnaissance Office as commander of the Enterprise Operations Squadron and as the space lead and chief of the Space/C4 Branch with the Joint Chiefs of Staff.

Not that it was all technology and engineering. For the three years Whitney was assigned to MILSATCOM, he was the program element monitor and chief on the congressional and media affairs team in the Space Acquisition Directorate — a job that gave him great insight into the budgeting and congressional process.

“Every job I’ve had through the years has helped shape and prepare me for what I am today,” Whitney told Inside GNSS, “and each assignment has provided those unique experiences I hope to draw from.”

MGUE & GPS III

One of those unique experiences, while he was senior materiel leader for the GPS User Equipment Division, was working with the 57 partner nations that buy GPS user equipment. The insight he gained there is particularly relevant now as signals from other satellite navigation constellations become available and can be incorporated into U.S. equipment — something Whitney calls “the smart way to go.”

“In the future it’s going to be important that our industry partners and the Directorate continue to investigate ways to pull in these new signals and include some the non-GPS signals into our user equipment,” he said, adding, “I don’t see why we shouldn’t go that way and couldn’t go that way.”

As for the GPS space segment, the GPS III program, he noted that the first of the GPS III space vehicles is fully assembled and ready for thermal vacuum testing, which verifies performance in the extremes of a simulated space environment.

“Thermal vac is one of the most important tests that we run,” said Whitney. “It’s kind of a culmination of things and so we’re getting ready to go into that. It verifies all the subsystem interfaces and everything else — so, once that completes, there’s a few more remaining things that are assembly integration test flow, but we’re on track for having a satellite available for launch in August 2016.”

In terms of next steps Whitney said he was now in the process of getting price options for GPS III space vehicles 11 and 12. The Directorate is also poised to release the RFP for the first of a possible two-phase process to recompete the GPS III contract.

“Phase 1 is where we’re going to do an assessment — is there actually a competition to be had?” says Whitney. “Phase 2 is going to be acting on that information to move forward to make the purchases that we need for future satellites.”

Whatever the challenges, Whitney expressed his confidence in his team, a group of people he described as energizing to work with.

“I’ve honestly never seen a more dedicated, more passionate group for getting things done, whether it be our government or FFRDCs [Federally Funded Research and Development Centers], our contractors, our civil partners — everyone is just so focused on the mission. It’s a joy to come to work and work with them every day.”
The Air Force may dial back plans to accelerate its military receiver program, possibly reversing an earlier decision to combine development and production steps as a way to meet a congressional procurement deadline.

The Military GPS User Equipment (MGUE) program is developing next-generation GPS receiver cards that can be swapped out, one-for-one, for the current receivers in a wide variety of existing military equipment. The new receivers will be able to tap the more powerful M-code signal, which is not only more secure and flexible but spectrally separated from the L1 and L2 civil signals — a distinct advantage in a jamming environment.

Lt. Col. James Wilson, program manager for the Military GPS User Equipment (MGUE) program, in an interview with Inside GNSS last year. The three vendors on the project — Rockwell, L3/Interstate Electronics Corporation, and Raytheon — were to begin delivering cards for evaluation this summer with a decision to be made in September about how to proceed.

Those cards are now “showing up on our docks literally every week,” said Michael Sanjume, deputy chief of the GPS Directorate’s User Equipment Division. Two different types of receivers, one for ground equipment such as radios and one for air/marine applications, began arriving in July and deliveries will continue into September.

“For us, the proof is in the pudding when you deliver hardware. So we’re very excited that we’ve had these to start our initial testing,” Sanjume said.

GAO Report Raises Questions

Although these initial deliveries are on schedule, the Government Accountability Office (GAO) released a report September 9 that calls the accelerated approach into question. GAO said the program has risks that were not addressed during early design work, risks that would “typically be revisited” during the now nonexistent CDR phase.

The Office of the Undersecretary of Defense for System Engineering, for example, identified some specific areas of concern in April, the report said. Certain security and cybersecurity design details had been deferred to a security verification review that was not scheduled to finish until late summer/early fall 2015. Early design work on the interfaces with the lead platforms chosen by each of the services may not have been rigorous enough “to account for implementing those designs across various operating environments.”

“The Undersecretary’s office also pointed out,” wrote GAO, “that the refinement of security countermeasures may result in later design changes.”

In addition to these points, the GAO highlighted a disagreement between the Army and the Directorate over whether the MGUE design actually meets the Army’s operational requirements, including the Army’s assertion that the GPS Directorate unilaterally edited a key requirements document over the Army’s “significant objection.” The problem, which involves average maximum versus instantaneous power limits, could force the services to do
additional development work to integrate the cards into their equipment.

Questions were also raised about the scope and usefulness of both early and planned MGUE testing — testing that won't be fully complete until sometime in 2019, well after the congressional M-code-only purchase mandate kicks in. The Army, for example, said that “fit check” tests conducted earlier this year showed the Defense Advanced GPS Receiver (DAGR) D3, the lead platform chosen by the Army, is unable to provide sufficient power to two of the three MGUE contractors’ ground receiver cards, according to the report.

Search Plan B
Sanjume said the Directorate and the Office of the Secretary of Defense were discussing the “actual maturity of the program, both technically and programmatically,” as well as the best approach to take for the next phase.

“We had originally planned on a combined production and development decision; and there might be basically a split and there might be a bit of a change to our strategy,” he said.

One possibility, Sanjume explained, is to change from going into production right after demonstrating the technology.

“In breaking it apart,” he said, there would be a development gate and then a gate into actual production where you could buy articles that would actually go into operations.”

Sanjume said his team believes development is complete as the result of the predecessor MUE program and that MGUE is “a fairly mature program.”

“We will get further guidance,” he told Inside GNSS, “from the Department [of Defense] on what will actually be decided this fall.”

While they wait for the decision Sanjume’s team continues to work with the services on integration plans and risk reduction activities, such as plugging the cards into equipment to see if they actually fit. The Directorate is also setting up a security certification and compatibility certification process for all MGUE receivers.

“So that will be something that will be part of our responsibility in the future,” said Sanjume, “and that is a bit of a change. We’ve been working very closely with all the different services to establish the program protection profiles, which are essentially the security requirements that we will set for each of the applications. We have made good progress on those and we are close to finalizing all of them.”

The compatibility and security certifications pose a challenge beyond the tasks themselves. They are making it harder for the Air Force to expand the vendor base for that cards as it had hoped.

To help address that, Sanjume said the directorate was exploring concepts for providing some of the intellectual property for the cryptography and security processing as a way to lower the cost of entry for new vendors, especially small businesses.

“We definitely have heard interest from industry on that front,” said Sanjume, “and we are looking at ways that we can basically enable it. We also believe that it’s one of the key things that we can do to foster more innovation into user equipment and faster cycle times — which I think is another strong theme of acquisition reform. So we’re absolutely very interested in this area.”

The MGUE program will undoubtedly be an area of special interest to Col. Steve Whitney, who in July became director of the GPS Directorate in the Space and Missile Systems Center at Los Angeles Air Force Base, California. For the two years before his appointment, Whitney served as the Senior Materiel Leader, Global Positioning System User Equipment Division, in the GPS directorate.
New Products & Company News @ ION GNSS+

**Sensonor’s STIM210 Gyro Module Gains Features**
The new version of the STIM210, Sensonor’s (Booth 317) small, lightweight, and low-power, ITAR-free, tactical-grade gyro module with 1, 2 or 3 gyros now offer users access to 65 continuously monitored parameters inside the sensor system. This feature improves system integrity and ensures access to reliable gyro data in safety-critical applications. Safety is a growing concern among users and regulators in several industry segments including unmanned aerial systems. With the new STIM210, the user can now continuously monitor the gyro system in greater detail. Linearity of the gyro is also improved, which particularly helps applications that rely on STIM210 for tuning feedback of a system.

**GPS Networking Launches Line of Mil-Spec Products**
GPS Networking Inc. (Booth 520) has introduced new lines of Mil-Spec products, including GPS splitters and GPS amplifiers. These new products passed rigorous Mil-STD 810F environmental standards, as well as a variety of tests for conducted emissions, conducted susceptibility radiated emissions and radiated susceptibility. These new products are currently being showcased on the company’s new website, <www.gpsnetworking.com>. Qual Test Summary Certifications detailing the specific tests, methods, and procedures are available for all Mil-Spec products upon request.

**Spirent PNT Test Framework for Threat Evaluation**
Spirent Communications (Island Booth C) announces its Robust PNT Test Framework that evaluates GPS and GNSS security vulnerabilities for Positioning, Navigation, and Timing (PNT) systems, for use by technology, system, and application developers where PNT is critical. Spirent’s framework enables threats to be detected in the field, taken into the lab and re-synthesized along with GPS and other GNSS signals. In addition, Spirent’s threat intelligence library of actual and typical threats provides a wide range of GNSS segment errors, spoofing attacks, and space weather and other vulnerabilities for preventive troubleshooting.

**Meet GPS World’s Great White Shark**
Film a video selfie with Mary Ann, the playful great white shark at GPS World’s booth (#413) Wednesday, 6–8 p.m. In 30 seconds, tell us who you are, where you work, and what you do with GPS/GNSS. We’ll film your video profile and post it to our YouTube channel! Then tell all your friends and family to watch <https://www.youtube.com/user/GPSWorldTV>. ION attendees are welcome to come by the booth at other times during the show to take their own selfies with Mary Ann.

**PLAY ION GNSS+ 15 EXHIBIT HALL PASSPORT GAME**
ION GNSS+ 15 Attendees will have a chance to win an Apple Watch and other prizes during the ION GNSS+ 15 conference being held September 14-18, 2015 at the Tampa Convention Center, in Tampa, Florida. Attendees will receive Passport cards following the Wednesday morning sessions, and can then stroll through the exhibit hall to meet with exhibitors and learn about their products or services. Make sure you get them to stamp your Passport card. Once you have 10 exhibitor-stamps on your card, return your card to the ION Membership Booth or the ION GNSS+ 15 Registration Desk to become eligible for the prizes. The prize drawings will take place on Thursday, September 17 at 3:40 p.m. in the exhibit hall. Attendees must be present to win the prizes.
However, funding issues are delaying announcement of a specific workshop date, and political disputes in Congress could force a government shutdown starting October 1, further complicating the schedule.

The new plan still calls for two phases of testing: currently deployed receivers and then, later on, receivers being developed to be brought to the market in the future.

During the first phase DoT proposes to test seven types of receivers as it works out the levels of interference — or interference tolerance masks (ITM) — at which receivers can still operate for frequencies stretching for 100 megahertz on either side of the L1 center frequency of 1575.42 MHz (i.e., from 1475 MHz to 1675 MHz).

“This range,” the DoT wrote, “is anticipated to include the passbands and transition bands of the filtering for most GNSS receivers processing signals in the 1559–1610 MHz band, as well as the MSS (Mobile Satellite Service) signals used to receive differential corrections for some receivers.”

The receivers to be tested include non-certified aviation devices as well as cellular, general location/navigation, high precision, timing, networks, and space-based receivers. Military receivers are not included in the DoT effort. The Federal Aviation Administration will be developing masks for certified aviation receivers.

The devices to be tested by DoT will be chosen based on their applications and importance, which might be judged by how they are used, the numbers of that model of receiver in use, and other factors such as economic importance.

**Multi-GNSS Receivers Move Up to the Front of the Line**

One of the changes from the Phase 1 test plan proposed in 2012 is the inclusion of currently deployed GNSS receivers, that is, devices using signals from multiple satellite navigation constellations.

“While the primary focus of this phase of the effort is on GPS receivers,” the new plan says, “it is recognized that there are fielded multi-GNSS receivers, and they will also be included in this first phase of testing.”

Initially such receivers were to be studied in the second, more future-oriented part of the two-phase testing process.

To support its efforts DoT says it will ask manufacturers for information on the nature and scope of each receiver’s usage as well as technical data.

The information being requested, which will be protected under nondisclosure agreements, includes details on the GNSS receivers’ front-end designs and on integrated receiver/antenna systems. Examples of the types of information to be requested include the number of amplification and filtering stages, the one-decibel gain compression point for the low noise amplifier (LNA), and frequency-dependent antenna gain.

DoT says that it plans to test against two types of interfering signals including one comparable to the “currently known proposals” for Long Term Evolution (LTE) broadband signals. The ABC Assessment was launched after a plan by would-be wireless broadband firm LightSquared had to be set aside because tests showed widespread interference to GPS receivers. The company, which had to file bankruptcy, is now close to emerging from Chapter 11.

DoT plans to rely primarily on radiated emissions testing, although it also intends to use conducted emissions tests. It also plans to look at the combined impact of having two signals operating at the same time. The nonlinearities found in the front end of GNSS receivers, the agency noted, can lead to the generation of a third powerful interfering signal.

Responses from interested industry participants in the debate followed predictable courses.

“We are reviewing the test plan and look forward to working with the DoT and interested parties to drive a consensus around compatible uses of the spectrum adjacent to GPS,” a representative of the GPS Industry alliance told Inside GNSS.

“Instead of developing a plan to enable technological advancement and spur spectrum innovation, the DoT is proposing to set limits on spectrum use by promoting the continued use of outdated filter technology in receivers,” said Ashley Durmer, a company spokesman for LightSquared.

“It has taken DoT almost four years to propose a vague study that is absent procedures or timelines and will not answer the critical question of whether wireless broadband would cause any actual harm to the accuracy of the GPS device,” she added. “In contrast, Roberson & Associates is investigating that critical data and analysis now.”

For further information on how to submit comments, see the Inside GNSS article at <http://www.insidegnss.com/node/4633>.
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