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October 17, 2016

Congressional Committees

Global Positioning System: Observations on Quarterly Reports from the Air Force

The satellite-based Global Positioning System (GPS) provides positioning, navigation, and timing (PNT) data to users worldwide. GPS is an essential U.S. national security asset and a key component of economic growth, national infrastructure, and transportation safety. The Department of Defense (DOD)—specifically, the Air Force—develops and operates the GPS system, which consists of three segments: space, which comprises a constellation of PNT satellites orbiting the earth; ground control, which primarily consists of running software in facilities that operate the satellites as well as monitoring and correcting signal data; and receivers, which help civil and military users employ GPS signals to determine their location, among other uses.

In the past several years, GAO has issued a number of reports related to GPS programs, including the most recent detailed assessment of the next generation operational control system (OCX) and development of military GPS user equipment (MGUE).¹ GAO assessed the OCX, GPS III satellites, and MGUE programs in our annual assessments of selected DOD weapon systems.²

The National Defense Authorization Act for Fiscal Year 2016 contained a provision that the Air Force provide quarterly reports to GAO on the next generation GPS acquisition programs.³ The Act also contained a provision that GAO brief congressional defense committees on the first report, and at GAO’s discretion, for subsequent quarterly reports. The Air Force delivered the first quarterly report to GAO on April 22, 2016. GAO assessed the report and briefed congressional committees in June 2016 on (1) the extent to which the Air Force’s report provided transparent information on the GPS acquisition program’s quarterly progress, risks, and short-term acquisition plans; and (2) observations for improving future Air Force quarterly reports on GPS.⁴ This report summarizes information provided at the briefing.

To conduct our work, we analyzed the Air Force’s report and assessed it using federal internal control standards, Office of Management and Budget guidance, and prior GAO work regarding the appropriate content to include in such a quarterly report. Drawing upon these standards, an effective quarterly report:

¹GAO, *GPS: Actions Needed to Address Ground System Development Problems and User Equipment Production Readiness*, [GAO-15-657](#) (Washington, D.C.: Sept. 9, 2015).

²GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-16-329SP](#) (Washington, D.C.: Mar. 31, 2016); *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-15-342SP](#) (Washington, D.C.: Mar. 12, 2015); and *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-14-340SP](#) (Washington, D.C.: Mar. 31, 2014).

³Pub. L. No. 114-92, § 1621 (2015).

⁴The committees requested briefings in June 2016.

- (1) provides useful, relevant, and timely key information with suitable levels of detail needed for oversight;
- (2) includes greater details on the program's short-term, but retains full program perspective;
- (3) reports key acquisition measures (such as cost, schedule, testing, performance, and risk);
- (4) enables understanding progress both quarterly (prior 3 months and planned 3 to 6 months) and long term, to enable comparisons between reports;
- (5) identifies areas needing extra focus, as appropriate.

We conducted this performance audit from April 2016 to October 2016 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

For nearly 9 years, the Air Force has been in the process of modernizing all three GPS segments to enhance performance and security. This effort is divided into three major programs to modernize the segments: (1) GPS III, which is developing a new generation of satellites; (2) OCX, which will replace the existing ground system to operate most of the current and future satellites while adding cybersecurity capabilities; and (3) for DOD users, MGUE, which will provide the military services with new receivers that can utilize next generation military code (M-code) GPS signals in hostile jamming or challenging environments. The warfighter needs all three modernization programs to be successfully developed and deployed in order to benefit from the M-code signal and increased cybersecurity. As we reported in 2015, OCX software development has experienced significant cost growth and schedule delays in the past few years that have subsequently delayed the implementation of M-code and cybersecurity for the military.⁵ To mitigate multi-year delays developing OCX and to maintain the current constellation above the minimum of 24 satellites, the Air Force created a fourth program called Contingency Operations (COps), which is intended to modify the current GPS ground system to operate the GPS III satellites at a reduced level of functionality until the first block of OCX is deployed.⁶

Results

Based on the first GPS quarterly report the Air Force provided to GAO, we found that the report provided important information on some efforts and some details on full or long-term program cost, schedule, performance, testing, and risk. For example, the report included individual program schedules and costs for some programs. However, we also found that the report did not include an integrated master schedule—key information needed to demonstrate the synchronization of all the programs. Additionally, there were gaps and inconsistent reporting of key acquisition measures. For example, the report identified when some risks will be resolved for the GPS III satellite program but not for the OCX and MGUE programs. Much of the

⁵GAO-15-657.

⁶According to the Air Force, COps will not replace OCX as it does not add any new capabilities. COps is a short-term mitigation strategy to operate the constellation of GPS satellites at the current capability. The COps program does not add enhanced cybersecurity or allow control of the advanced M-code signal—both of which require a completed OCX system.

information in the quarterly report duplicated information already available in other reports. However, it is unclear when the data were collected because the information was not marked with a source date—key information to understand its timeliness. Further, the report lacked a quarterly focus, looking neither forward one quarter nor backward for another. Finally, the information on COps was insufficient as it was mentioned only as a mitigation strategy for OCX delays. The report did not provide any information on its acquisition strategy or future milestones, such as its planned completion date.

Transparency could be improved in future reports if the Air Force included some additional information, such as:

- (1) an integrated master schedule that clearly shows synchronization of the four programs;
- (2) a forward outlook and details on what to expect for each program over the next 3 to 6 months to gauge progress, such as milestones and key decision points;
- (3) updates to expected completion dates noted in previous reports to demonstrate progress and explanations for any deviations;
- (4) details on acquisition risks, both at the segment level and across the collective GPS acquisition, including plans to reduce risk and the projected closure date for each risk;
- (5) additional context for key data reported, such as the cost estimate source and approval date or the “as of” date for schedule events to ascertain the timeliness of the information;
- (6) additional details on the COps program, such as its acquisition strategy and key dates; and
- (7) a date to identify each quarterly report to distinguish between reports.

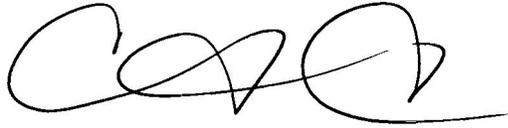
In response to our initial observations on the first quarterly report, DOD and Air Force officials acknowledged some adjustments would be necessary to improve transparency and stated they would consider making changes starting with the next GPS quarterly report. We are not making recommendations to the Air Force at this time given the limited time for and scope of our review. We will continue to monitor DOD and Air Force efforts to improve the transparency of the quarterly reports.

Agency Comments

DOD and Air Force provided technical comments on a draft of this report, which we incorporated as appropriate.

We are sending copies of this report to appropriate congressional committees and the Secretary of Defense and the Secretary of the Air Force. This report will be available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or chaplainc@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report include Dave Best, Assistant Director; Pete Anderson; Andrew Berglund; Patrick Breiding; Connor L. Kincaid; and Jonathan Mulcare.

A handwritten signature in black ink, consisting of several overlapping loops and a long horizontal stroke at the end.

Cristina T. Chaplain
Director, Acquisition and Sourcing Management

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