

Defense Matters

National PNT Infrastructure

Getting the U.S. on the Path to Resilience

There is a dichotomy between our national space-based positioning, navigation and timing (PNT) policies and the decades-old recognition that overreliance on the Global Positioning System (GPS) as the single source for PNT leaves U.S. critical infrastructure vulnerable.

The May 2021 Colonial Pipeline computer hack serves as an all too recent example of how vulnerable Americans are to single-source supply chains. The hack, attributed to a group known as DarkSide, shut down 5,500 miles of pipeline, interrupting the flow of gasoline across the United States' Southeast and Mid-Atlantic regions.

The ramifications of an intentional disruption of GPS have been theorized about and analyzed ad nauseum. Even if only one specific sector of our critical infrastructure was the primary target of a space-based PNT interruption, there would most certainly be collateral damage beyond the intended target.

We must find a way to get out of this unending refusal to address the reality of overreliance. Though national space-based PNT policy dating back to the Bush era has highlighted the need for a backup to GPS, nothing has been done to date.

The 1984 Federal Radionavigation Plan's (FRP) Executive Summary contained a passage that clearly conveyed the challenge of meeting the needs of all PNT users. "The goal [of the FRP] is to select a suitable mix of these common civil/military systems which can meet diverse user requirements for accuracy, reliability, coverage, operational utility, and cost; provide adequate capability for future growth; and minimize duplication of services. The process of selecting a system mix is a complex task, since user requirements vary widely and change with time."

That clarity of purpose is noteworthy as just four years later, with the aftermath of 1986 Challenger accident still interrupting the intended launch strategy for GPS, the 1988 FRP's language had evolved to state: "The need to consolidate and reduce the number of systems is a major objective of DOD and DOT (the Departments of Defense and Transportation). The constantly changing radionavigation user profile and rapid advancements in systems technology, as well as delays in the U.S. space programs, require that the FRP and the policies stated therein remain as dynamic as the issues they address."

With seven years to go before GPS was declared fully operational in July of 1995, the federal government was already charting a course to reduce the number of PNT systems operated by the government.

The emphasis on economizing in the 1988 plan was underpinned by the significant cost of deploying GPS. However, the myopic view at the time — which fixated on cost and dispelled the vulnerability created by limiting PNT options — has persisted for three different administrations. But, as they say, that was then and this is now. Since 1988, the rapid growth of the internet, the emergence of drones and other autonomous systems — including the Internet of Things — has dramatically changed the consequences should there be a problem with GPS.

Less than 10 years after GPS was declared operational, the risk to overreliance on a single source of PNT was recognized in the 2004 Bush era, U.S. space-based PNT policy issued in December 2004 (National Security Policy Directive-39 (NSPD-39)). The policy tasked the Department of Transportation, in coordination with Homeland Security, to: "...develop, acquire, operate, and maintain backup position, navigation, and timing capabilities that can support critical transportation, homeland security, and other critical civil and commercial infrastructure applications within the United States, in the event of a disruption of the Global Positioning System..."

Subsequent administrations have continued to address GPS from the perspective of that national space-based PNT policy statement but have yet to make headway. GPS remains a single source, supply chain issue and it is understood that that leaves critical infrastructure at risk.

It's now time to approach the challenge from a broader policy perspective and formulate a single national policy for PNT that goes beyond the current space-based paradigm to incorporate many of the attributes that helped make GPS the world's gold standard for space-based PNT.

At present, there are two separate, and not equal, presidential issuances related to PNT. The first is Space Policy Directive 7, signed by President Donald Trump at the end of his administra-



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tion, which replaced Presidential Decision Directive NSTC-6. The second is Executive Order 13905, issued in February 2020, which addresses the need for responsible use of PNT services by federal departments and agencies. However, as separate orders, they do not have the coherence necessary for a true national policy for PNT.

As with the development of the 1996 Presidential Decision Directive/ NSTC-6, which was co-chaired by the National Security Council and the Office of Science and Technology Policy, the Joe Biden Administration should establish an all-of-government, multi-agency team to craft a National PNT policy that directly addresses the issues of funding and critical infrastructure.

Congress needs to be engaged in this issue because of the need to appropriate funding. There are already multiple examples in recent years where Congress has injected language into the annual National Defense Authorization Act

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(NDAA) to influence development of the DoD PNT enterprise and the use of an open-architecture strategy for ensuring military PNT utility and resilience.

However, the DoD is not responsible for extending its systems and applications, many of which are classified, to the

domestic, civil, public, and commercial infrastructure. That responsibility must, of necessity, rest with the civil agencies led by the Departments of Transportation and Homeland Security. These agencies need the authority of a national policy and congressional support made manifest through sufficient funding.

The ongoing political party debate on what defines infrastructure, spurred on by Biden's infrastructure goals, may be a catalyst to highlight the vulnerable state of our national PNT capabilities, and prompt constructive action on appropriations to invest in PNT infrastructure.

The multi-agency policy team should be comprised of thinkers who are creative, innovative and empowered to bring about change. The goal of the effort should be to continue to champion GPS as a foundational PNT resource, but have an ultimate goal of developing a robust and resilient national PNT capability that protects our critical infrastructure. 🌐



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