

Seven Easy Ways the Administration or Congress Could **Get a Quick Win** Protecting GPS and America

For more than a decade since the promulgation of a presidential directive, the United States has wrestled with the mandate to develop a backup for the Global Positioning System. A long-time navigation leader proposes some initial steps that the nation could take to enable enhanced Loran to be the system to accomplish that mission.

The U.S. Secretary of Defense has said “I hate GPS” and “I want to unplug the military from GPS.” Senior officials at the Department of Homeland Security (DHS) have called GPS “a single point of failure for critical infrastructure.”

GPS signals are used by virtually every technology. Their disruption for more than a brief period of time or over more than a small area could impact cell phone service, financial systems, computer networks, emergency radio systems, and every mode of transportation. It could be catastrophic for America.

A 2004 Presidential order revalidated in 2009 mandates creation of a complementary and backup system for GPS. In 2008 the Department of Homeland Security announced that they would transition the Loran-C system to enhanced Loran (eLoran) for this purpose.

This never happened.

In 2015 the deputy secretaries of defense and transportation told members of Congress that

the administration would build an eLoran timing system first, and then a navigation system. Establishing the network would provide a high power difficult to disrupt system alongside GPS to deter malicious disruption and ensure essential navigation and timing signals were always available to America.

Action on the most recent commitment has been slow. The following proposals offer seven easy ways our leaders can act now and make us much, much, safer.

Policy (No Cost to Government). To stimulate the market for a commercial eLoran system and ensure that it would be built, operated, and successful:

1. Establish being able to operate without navigation and timing signals from space for 30 days as a best practice for owners and operators of critical infrastructure. (Why wouldn't we do this anyway?)
2. Require that, as of fiscal year 2019, every federal government contract include a provision

that the contractor must be able to continue to deliver for 30 days, if navigation and timing signals from space became unavailable. (This could work if just the Department of Defense did it, by the way).

3. Require that, as of fiscal year 2019, autonomous or remotely controlled aircraft and maritime vessels in U.S. airspace or coastal waters have two independent sources of electronic navigation — mandating that one system can't be from space, and each has to maintain good location for at least an hour without the other.

Leadership (No Cost to Government).

4. Convene the leaders of the major telecommunications and web/cloud services to discuss GPS vulnerability, the need for assured precise time and location, that government analysis has identified eLoran as the best solution,

Example Government Programs That Need a Complementary and Backup System for GPS

Almost every program and technology needs such a system. This list shows some of the ones with high profiles and that are more expensive.

FAA - Automatic Dependent Surveillance Broadcast system (estimated \$2 billion) – This air traffic control system experienced some failures for 13 hours during January's 13.7-microsecond GPS time transmission error.

Department of Defense - Protection of National Security Space Assets (\$1 billion/year for five yrs) Implementing a terrestrial eLoran system would make GPS satellites and signals (which are the responsibility of the Air Force) less desirable targets for terrorists and nation-state adversaries.

FAA - Next Generation Air Traffic Control System (NextGen) project (estimated \$40 billion) – Requires both precise time to align all its ground-based technology and navigation to prevent GPS from being a single point of failure. The project is planning on preserving about 2,000 terrestrial aviation beacons costing much more than eLoran. Many, if not all, could be eliminated over time.

Department of Defense – Continuity of Operations (billions/year) – DoD spends billions of dollars a year to ensure it will be able to operate during emergencies (more than \$50M/yr just for bottled water and emergency generators). DoD, and its critical suppliers, will not be able to operate for more than a couple of days during a domestic GPS disruption. The Army National Guard (the nation's largest group of first responders - \$18B/yr) and all first responders require GPS for the proper operation of their radio systems which were some of the hardest hit by the January GPS timing error.

Department of Homeland Security – Cyber Security (estimated \$590 million/year) – GPS jamming and spoofing are cyber security issues as they disrupt communications pathways, servers, and end-use devices, and can insert false time and location information into data bases.

and that such a system would cost less than \$50 million/year. Suggest that these industries form a non-profit to build and operate the system. Benefits to telecom and web industries would be:

- a. Better spectrum efficiency and improved throughput when pairing GPS with a second, stronger, stable time signal, including "Proof of Time."
- b. Better spatial efficiency when pairing GPS with a second, stronger, alternative location signal, including "Proof of Position."
- c. Less expensive/more resilient synchronized timing to support network operations and continuity of operations.
- d. The ability to develop and profit from new applications built upon this new IT utility.

Fairly Small Expenditure(s) (building system now, with costs to government starting in Fiscal Year 18).

5. Less than \$50 million/year: Let a services contract for specified signals. Details of building, operating, and maintaining the system to provide the signals would be the responsibility of the contractor.
6. Less than \$50 million upfront to be paid back (and more) through license fees: Establish a public-private-partnership that provides the basic signal and have the government and private partner share revenues from value-added services such as increased precision, data transmission, and so forth. It would be easy for the government to recoup an initial investment in the system and generate surplus revenue in the first 10 years of the partnership.
7. Require government programs and mission-critical systems to be able to operate for 30 days without navigation and timing signals from space. Agencies would prioritize existing projects and funds to identify the very marginal cost each would pay to operators of commercial terrestrial timing and navigation systems. (See sidebar, "Example Government Programs That Need a Complementary and Backup System for GPS.")

Critical Next Steps

The administration has taken important first steps by admitting the problem and identifying a solution. All that remains is to identify and empower a lead agency. Acting now will avoid adding more delay to the 12 years since the president mandated a solution. There is no reason to do otherwise.

Author



Dana A. Goward is the president & executive director of the Resilient Navigation & Timing Foundation, a nonprofit, public benefit corporation that helps protect critical infrastructure by promoting resilient navigation and timing worldwide. In 2013 he retired from the federal Senior Executive Service having served as the maritime navigation authority for the United States and director, Marine Transportation Systems for the U.S. Coast Guard. 