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25 October 2016

Senator John Thune, Chairman,
Committee on Commerce, Science and Transportation
511Dirksen Senate Office Bldg.; Washington, DC 20510

Dear Senator Thune:

The Council of American Master Mariners, Inc. (CAMM) is a non-profit professional organization representing licensed Master Mariners who command American-flag merchant ships sailing world-wide in both foreign and domestic service. CAMM also represents "Maritime Professionals" working ashore in the maritime industry and waterfront business communities; as well as others in leadership positions in maritime-related government agencies (U.S. Coast Guard, U.S. Maritime Administration, NOAA, U.S. Navy, as well as DOT & DHS staffers). You may check us out at: www.mastermariner.com.

We are writing you to express our concern over the vulnerability of our Global Positioning System (GPS) – and the marine transportation system's dangerous dependence upon it -- and to offer some relatively easy and inexpensive solutions that can be put in place in the near term.

FYI, the following incidents have given us cause for great concern --

- In 2014 a trucker with a small "personal" jamming device accidentally shut down part of a US container port for seven hours.
- In 2015 the US Coast Guard identified jamming and spoofing of GPS to be a significant cyber security problem.
- This year the US Coast Guard issued a safety alert reporting maritime GPS jamming at sea and cautioning vessel operators to be on guard.

The Commandant of the U.S. Coast Guard (and other high-ranking government officials) has called America's dependence on GPS "*a single point of failure for critical infrastructure.*" This is certainly true for our maritime transportation system and all the ships at sea.

Nearly every shipboard and shore-based electronic system depends upon the GPS signal for proper functioning. These systems range from gyro compasses aboard ship, to container cranes in ports; to the financial, telecommunications, information, and other networks that underpin every transaction in global logistics today. Yet ships, port authorities, marine terminals operators, logistics centers, and other "maritime interests" have all experienced numerous accidental and malicious disruptions that have shut down ports operations, inhibited navigation, and otherwise delayed and added cost to global logistics operations.

Fortunately, the incidents that we know of to date have been relatively localized, of short duration, and of modest consequence. This may not always be the case, however. Every incident has the potential for disaster.

There are many measures that can be taken to avert such disasters for our maritime industry, the waterfront business communities, and the country as a whole. The most effective, by far, is to implement a complementary, difficult to disrupt, electronic navigation system for everyone to use alongside GPS – as a reliable "back up".

In December of last year the Deputy Secretaries of Defense and Transportation informed Congress that ***eLoran*** is the best solution, and that they can build such a network quickly and inexpensively with approval and help from Congress. We are concerned that, rather than acting to make this promise a reality, the administration has announced that it has embarked on another "study of the problem" (its sixth by our count) and will delay any action until 2019 or beyond. We cannot -- we must not -- simply "kick the can down the road" that way!

We at CAMM are doing our part by supporting the establishment of standards for maritime electronic navigation that will allow easy incorporation of eLoran signals. Similar signals are available now from Russia, China, Saudi Arabia and South Korea. We should have the same access here in the USA for navigating our coastal and offshore waters.

But your action is needed NOW to safeguard America and navigational operations in our waters. We urge you as a part of any end-of-year legislative opportunity to designate a responsible department and agency to execute the ***eLoran project***, and give them the tools (and funding) to succeed.

Enclosed with this letter is a list of seven actions that Congress could take, any one of which would greatly mitigate America's risk from GPS vulnerability. Most of these could be enacted with no cost to the government.

We strongly recommend that, before this session is out, Congress:

- Appoint an agency to be responsible for implementing the eLoran solution the Deputy Secretaries said America needs.
- Enact one or more of the enclosed provisions to empower that agency and the private sector and enable them to quickly implement an eLoran system to protect GPS and America.

We are eager to assist you and your staff addressing this problem. Feel free to contact the undersigned to pursue this matter further and in greater detail. Over-dependence on GPS and its vulnerability has America standing into danger. We ask for your prompt action and support to make America safer and stronger.

Respectfully,

Captain Jeff Cowan
National President, CAMM

Attached:

- Congressional Options to Quickly Protect America from GPS Over Dependence

Congressional Options to Quickly Protect America from GPS Vulnerability and Over-Dependence

Note: One of the largest obstacles to action over the last eight years has been the lack of a clearly designated and empowered lead federal agency. Congress must designate such an agency and then empower it with policy and/or budget actions such as the following.

Policy (no cost to government)

To stimulate the market for a commercial system and ensure 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.

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.

3. Require that, as of fiscal year 2019, autonomous or remotely controlled aircraft and maritime vessels in US airspace or coastal waters have two independent sources of electronic navigation. One 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, and that such a system would cost less than $50M/yr. Suggest they 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) - System built now by commercial entity, costs (subscription fees) to government starting in FY-18:

5. **Less than $50M/yr:** Let a services contract for specified signals. Details of building, operating and maintain the system to provide the signals would be the responsibility of the contractor.

6. **Less than $50M upfront, 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, etc. It would be easy for the government to recoup an initial investment in the system and generate surplus revenue in the first ten 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 such as eLoran. Some examples of high profile and expensive systems:

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

   Department of Defense - Protection of National Security Space Assets ($1B/yr for 5 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 project (est $40B) – 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/yr) – 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 ($587M/yr) – GPS jamming and spoofing is a cyber security issue as it disrupts communications pathways, servers, and end-use devices, and can insert false time and location information into data bases.