America's Decision to Build eLoran – Rationale & Analytic Rigor

Summary

Numerous government, academic and industry studies have examined America's dependence upon GPS and the risk that creates for our systems and infrastructure. Of all the documents we have been able to find:

- All recommend the risk to the nation be mitigated by diversifying the source of PNT signals
- All that make a recommendation for a complementary and backup system for GPS have named eLoran as the most effective and economical system.
- None recommend against eLoran.

Why the US Decided to Protect and Augment GPS with eLoran

Some portion of the GPS time and location signal has been incorporated into most all our technologies. In 2004 the President directed[i] that DOT consult with DHS and acquire a backup capability. After much study by many agencies and departments, in 2008 the Department of Homeland Security announced that it would transform the old Loran-C system to eLoran and provide that capability[ii] f

eLoran was selected by agreement across the federal government because:

- **The eLoran signal is very different the GPS signal**. Something that disrupted GPS would be very unlikely to disrupt eLoran. The two signals are on very different frequencies, one is from space, the other from Earth, and their strength and other characteristics are very different.
- **It is a mature technology.** It is in use now in northwestern Europe and is being deployed in many other countries as they upgrade their Loran-C systems.
- **It meets the needs of almost all users.** Nothing, not even GPS, meets everyone's needs. But, we estimate that more than 95% of all GPS users would have all requirements met.
- **It's inexpensive.** Nothing is free, but for less than half of what the US government budgeted for GPS in 2015 alone we could build and operate a US eLoran system for 20 years (note the RNT Foundation is an unequivocal supporter of GPS and does not support reduction or diversion of any funding from GPS programs)

While the government's decision to build eLoran was never reversed, it has not been acted upon.

Studies and Recommendations

America's reliance on GPS has greatly increased since 2008. Most publically released studies since that time have discussed risks and vulnerabilities, but have not identified needed systems. This has probably been to avoid incurring a budget obligation for their government sponsors.

As mentioned earlier, those studies, both before and after 2008, that have made a recommendation have named eLoran. No study has said it is not a very important part of what should be done to protect America.

The following is a summary of five significant analytic efforts:

1. *Independent Assessment Team (IAT) Summary of Initial Findings on eLoran,* Institute of Defense Analysis, January 2009

http://rntfnd.org/wp-content/uploads/Inst.-Defense-Analysis-Report-to-DHS-DOT.pdf

"…the IAT unanimously found and recommended to the sponsor and co-sponsor on 13 December 2006 that eLoran be completed and retained as the national backup system for critical safety of life, national and economic security, and quality of life applications currently reliant on position, time, and/or frequency from GPS."

2. *Jamming the Global Positioning System - A National Security Threat: Recent Events and Potential Cures,* National PNT Advisory Board, November 2010

http://www.gps.gov/governance/advisory/recommendations/2010-11-jammingwhitepaper.pdf

"We strongly recommend that the previously announced decision (to deploy eLoran as the primary Alternate PNT) should be reconfirmed and quickly implemented."

3. ***Benefit-Cost Assessment Refresh - The Use of eLORAN to Mitigate GPS Vulnerability for Positioning, Navigation, and Timing Services - Final Report,*** Volpe National Transportation Systems Center November 2009

http://rntfnd.org/wp-content/uploads/Benefit-Cost-of-eLoran-Volpe-Center-2009.pdf

"eLORAN remains a viable, cost-effective potential back up for GPS. It is currently the only non-satellite Positioning, Navigation, and Timing (PNT) system that has been tested and can provide a multi-modal back up for the PNT services GPS provides. Given the growing importance of and dependence on PNT services, it is increasingly cost-beneficial to provide back up capability to those services."

4. *Loran's Capability to Mitigate the Impact of a GPS Outage on GPS Position, Navigation, and Time Applications* Federal Aviation Administration, March 2004

"Thus, the evaluation was done not for the benefit of Loran users but for the benefit of current and future GPS users, so that they might retain the benefits they derive from their use of GPS. The evaluation shows that a modernized Loran-C system could satisfy the current NPA, HEA, and timing/frequency requirements in the conterminous United States and could be used to mitigate the operational effects of a disruption in GPS services, thereby allowing the GPS users to retain the benefits they derive from their use of GPS."

http://rntfnd.org/wp-content/uploads/FAA-Report-2004-Lorans-Capability-to-Mitigate-the-Impact-of-a-GPS-Outage-on-GPS-PNT-Applications.pdf

5. *Resilient Position, Navigation & Timing (PNT) - Summary of Business Case considering options for alternative positioning,* General Lighthouse Authorities of the UK and Ireland, 2011

"On the basis of the economic analysis, the net financial benefits and ongoing savings of implementing eLoran in the case of the British Isles would be substantial."

http://rntfnd.org/wp-content/uploads/UK-Summary-Business-Case-options-for-alternative-positioning.pdf

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Note: eLoran has demonstrated position accuracy between 6 and 8 meters and timing of 50 ns.
http://rntfnd.org/wp-content/uploads/2015-ION-ITM-Offermans-eLoran-IOC-in-UK-final-4Feb.pdf

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[i] http://fas.org/irp/offdocs/nspd/nspd-39.htm
[ii] http://rntfnd.org/wp-content/uploads/DHS-Press-Release-GPS-Backup-2008.pdf