Resilient Navigation & Timing
US Government Policy & Decisions - Summary

While reliance on a single source for precise navigation and timing information has been a recognized as a potential problem since the 1980's, the United States first began addressing it in a more deliberate way in the early years of this century. Innumerable studies, presentations, and policies have been published on the issue.

This timeline begins with the first public recognition of the problem by the President in 2004 when he mandated acquisition of a PNT "backup" to GPS. As of this writing, no such system has been acquired.

Some of the more salient U.S. government decisions and policies since 2004 are outlined below[1].

Dec, 2004 – **NSPD 39, U.S. Space-Based Position, Navigation, and Timing Policy** (Classified). [2]

- Goals included:
  - Maintain PNT "…augmentation and backup…" capabilities
  - "…provide uninterrupted availability of (PNT) services…"
- Established National Space-Based Positioning, Navigation, and Timing Executive Committee (PNT EXCOM), National Coordination Office, & PNT Advisory Board
- Tasked DOT and DHS to " Develop, acquire, operate, and maintain backup position, navigation, and timing capabilities…" per HSPD 7 dtd 17 Dec 2003[3]

Note: President Obama ratified this NSPD when he came into office and has not replaced or rescinded it since. It is still in force.

March 2007

- **DOT & DHS accepted the Institute for Defense Analysis report** recommending enhanced Loran (eLoran) as national backup system[4].
- **PNT EXCOM supported this approach** and tasked DOT & DHS with developing an action plan that included designating an executive agent.

[1] Much of the early portion of this timeline is documented in the 2010 Federal Radionavigation Plan available at: http://www.navcen.uscg.gov/pdf/2010_FRP_FINAL_Signed.pdf

[2] Unclassified parts summarized: https://www.fas.org/irp/offdocs/nspd/nspd-39.htm

[3] https://www.dhs.gov/homeland-security-presidential-directive-7

[4] http://ntl.bts.gov/lib/31000/31300/31359/24_2009_IAT_Summary_of_Initial_Findings_on_eLoran.pdf

February 2008

- **A DHS press release stated that the department would implement eLoran**, using the old Loran-C infrastructure (7 February)

- **The DHS "2009 Budget in Brief" proposed transferring the legacy Loran-C systems and $34.5M/yr from Coast Guard to NPPD**, stating:

  > "The FY 2009 budget transfers the budget authority for the LORAN C system from the United Sates Coast Guard to the NPPD. The Department, acting as Executive Agent, will begin development of enhanced eLORAN as a backup for the Global Positioning System (GPS) in the homeland."

March 2008 - **PNT EXCOM endorsed DOT/DHS decision** to transition Loran to eLoran

September 2008

- **"National PNT Architecture Study – Final Report"** was published. This public document was prepared by the National Security Space Office. It called for decreased reliance on GPS as a single source for navigation and timing information.

- **Continuing Resolution that provided funding for DHS in FY 2009 did not include an excursion to** transfer funding and authority for Loran to NPPD. Members of Congress and staff expressed support for eLoran, but were concerned at the lack of a documented transition plan for the move between agencies. Staff indicated that the request should be resubmitted with the next year's budget, along with a transition plan, and that it would be approved.

January 2009 – **Institute of Defense Analysis** Report "Independent Assessment Team (IAT) Summary of Initial Findings on eLoran". Report, co-sponsored by DOT and DHS, strongly recommends eLoran as national complement to GPS.

October 2009 – **DHS FY-10 Appropriations Act directed termination of Loran-C signal** in Jan 2010[5]. No funds were provided to establish a new system.

January 2010 – **National PNT Advisory Board** "Jamming the Global Positioning System – A National Security Threat: Recent Events and Potential Cures" This white paper includes numerous recommendations, one of which is prompt execution of the US decision to implement eLoran as a terrestrial backup for GPS.

October 2010 - **USCG Authorization Act (Sect 219) required DHS to determine if a single domestic GPS backup for navigation** was needed before dismantling Loran infrastructure.

September 2011- **DHS report to Congress "Analysis of Whether a Single Domestic Backup Navigation System is Needed for the Global Positioning System (GPS)"** Report labeled "For Official Use Only." A redacted copy of the report[6] was obtained in 2015 under FOIA by the RNT Foundation. It stated that Loran was not needed for a universal navigation backup, but that 15 of 18 critical infrastructure sectors used GPS timing, there may not be adequate backup, and more study was needed. However, since the department certified Loran was not needed for a navigation backup, per congressional direction. Dismantling and disposal of infrastructure began.

November 2011 – **DHS National Risk Estimate** concluded "U.S. critical infrastructure sectors are increasingly at risk from a growing dependency on GPS for positioning, navigation, and timing (PNT) services; such dependencies are not always apparent." Full report obtained under FOIA in 2105.

February 2012 - **Wireless Precise Time project** began by DHS (through US Coast Guard) through Cooperative Research and Development Agreement (CRADA) with UrsaNav, Inc. using some of the remaining Loran infrastructure.

August 6, 2013 – **Progress brief on Wireless Precise Time CRADA** to DHS & interagency staff. Project confirmed eLoran meets needs of almost all users & is very hard to disrupt.

[5] http://www.gpo.gov/fdsys/pkg/PLAW-111publ83/pdf/PLAW-111publ83.pdf
[6] http://rntfnd.org/wp-content/uploads/Sec-219-redacted-Non-FOUO.pdf

October 2013 - **DHS shortened the term of the CRADA & directed expeditious disposal of infrastructure.**

December 2013 – **National Defense Authorization Act for 2014** directed the administration to report to Congress on how, in the event space systems are disrupted, DOD and the intelligence community ***"…plan to provide necessary national security capabilities through alternative space, airborne, or ground systems…"***[7]

February 2014 – **House Committee on Transportation and Infrastructure** included the following language in the Coast Guard Authorization Act of 2014:

SEC. 221. E-LORAN.

(a) IN GENERAL.—The Secretary of the department in which the Coast Guard is operating may not carry out activities related to the dismantling or disposal of infrastructure that supported the former LORAN system until the later of—

(1) the date that is 1 year after the date of enactment of this Act; or

(2) the date on which the Secretary provides to the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate notice of a determination by the Secretary that such infrastructure is not required to provide a positioning, navigation, and timing system to provide redundant capability in the event GPS signals are disrupted.

(b) EXCEPTION.—Subsection (a) does not apply to activities necessary for the safety of human life.

(c) AGREEMENTS.—The Secretary may enter into cooperative agreements, contracts, and other agreements with Federal entities and other public or private entities, including academic entities, to develop a positioning, timing, and navigation system, including an enhanced LORAN system, to provide redundant capability in the event GPS signals are disrupted.

December 2014 – **President signs S.2444, the Howard Coble US Coast Guard Authorization Act for 2014 into law.** It contains the provisions cited above regarding a GPS backup system and eLoran.

[7] http://rntfnd.org/2014/01/01/us-congress-focuses-on-space-vulnerability-in-defense-act/

January 2015 – The US Army issues a Request for Information regarding purchase of 50,000 eLoran receivers for use by DOD units around the world.

March 2015 –

- The Department of Transportation announces in the Federal Register that the government is considering eLoran for a backup to GPS and asking for public comment by the 22nd of May.
- Congressman Garamendi introduces a bill that would amend the GPS section of Title 10 to also require the Secretary of Defense to work with the Secretary of Transportation and build a difficult to disrupt terrestrial system to complement and backup GPS.
- DHS issues a press release announcing resumption of the CRADA examining the use of eLoran signals.

August 2015 –

- Five Congressmen write to the Deputy Secretaries of Transportation and Defense expressing concern over the lack of action on its commitment to a complementary and backup system for GPS and the threat over-dependency on GPS poses to the nation.[8]

December 2015 –

- The Deputy Secretaries of Transportation and Defense send a letter to the five Congressmen stating that the administration will first build an eLoran timing system and then a larger network to provide positioning, navigation and timing.[9]

January 2016 –

- A software error in a GPS control system caused 15 of the 31 satellites to transmit timing signals that were in error by 13.7 microseconds. This minor problem caused alarms, activation of backup systems, and other faults in many receivers around the world. Digital radio broadcasts were disrupted in Europe, public safety communications systems, telecommunications systems, and aviation ground systems were all impacted. The incident was widely observed by the electric power and science communities.[10] See blog posts at RNTFnd.org for more information on the incident.

[8] http://rntfnd.org/wp-content/uploads/Congressional-Letter-to-PNT-Executive-Committee.pdf
[9] http://rntfnd.org/wp-content/uploads/DSD-and-Dep-DOT-reply-to-Mr.-Garamendi.pdf
[10] http://rntfnd.org/2016/02/15/us-govt-gps-errors-felt-around-the-globe-across-industries/

As of February 2016 no visible action has been taken by the administration to establish a complementary/backup system for GPS. Members of Congress are urging the administration to appoint one department as the single federal executive agent for the GPS complementary/backup system as the lack of leadership seems to be the biggest obstacle to progress.