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eLoran Next Generation Trial Program: Western United States

Delivered to ICE PPR – March 22, 2021

GPS/GNSS Disruption/Spoofing: An international problem

BREAKING DEFENSE

DEFENSE REFERENCE

IDEX: Defense Firms Oppose Israeli Decision To Stop UAE Flights

US, European Fighters in Mideast Share ISR Data Well

AF, Navy May Both Fly DARPA Missile Mothership

Why Nuclear Force Modernization Must Happen: Maj. Gen. Lutton

They're Back: US Subs To Carry Harpoon Ship-Killer Missiles

Russians Tried to Jam NATO Exercise; Swedes Say They've Seen This Before

The Russians played around at the edges of this month's Trident Juncture exercise in the Baltic Sea, however, have some concerns.

By PAUL MCLEARY on November 20, 2018 at 1:57 PM



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1.2K

DAILY NEWS 10 August 2017

Ships fooled in GPS spoofing attack suggest Russian cyberweapon

Europe

Finland, Norway press Russia on suspected GPS jamming during NATO drill

By: Gerard O'Dwyer November 16, 2018

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Russian GPS Jamming at NATO's Trident Juncture Exercise

By Brooks Tigner

Technical Merit Summary: eLoran Resilient PNT

The Global Positioning System (GPS) has 32 satellites supporting over 6 billion users and devices globally with nearly 1 billion in the United States and is often described as the invisible utility. Our adversaries are rapidly developing hypersonic satellite killers and Russia has even deployed satellites that can hunt down and destroy other satellites. Taking out our GPS satellites will make it extremely difficult and dangerous for our warfighters to carry out their missions.



Enhanced Long Range Navigation (eLoran) is a proven, land-based signal transmitted from 19 towers for national coverage.



eLoran has a range of 1,200 miles, can penetrate buildings, tunnels, and is **3 - 5 million times stronger than GPS** making it nearly **jam proof** while providing the same capabilities as GPS.



19 legacy sites provide full Positioning, Navigation and Timing (PNT) coverage for the US as a backup to GPS – and in some operational environments can replace GPS where greater accuracy and improved reliability is crucial.



“You’ve heard that we are the best in the world in space, but our adversaries know it, and so they’re investing in capabilities to take that away from us and it’s our job as military leaders just to ensure that can’t happen”

Air Force Chief of Staff Gen. David Goldfein



The 19 legacy US eLoran Towers: This circle represent the effective range of single tower

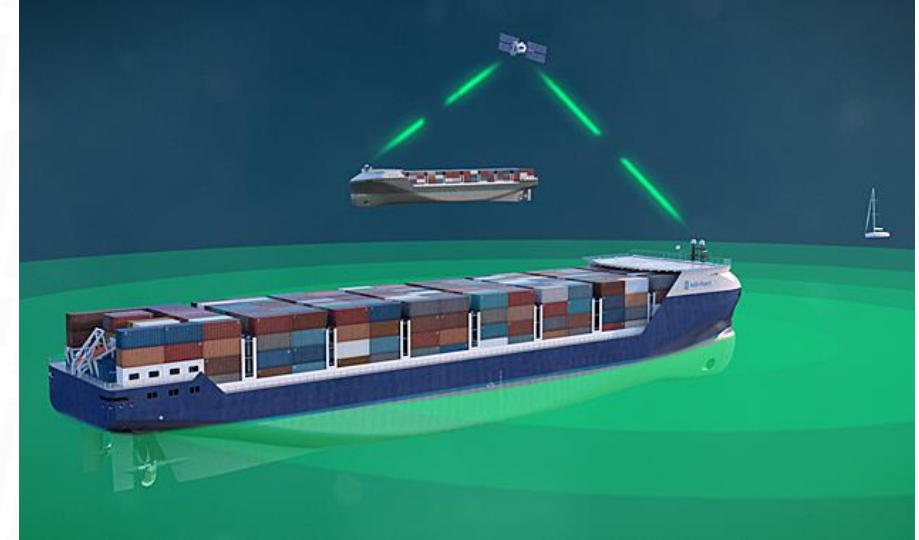
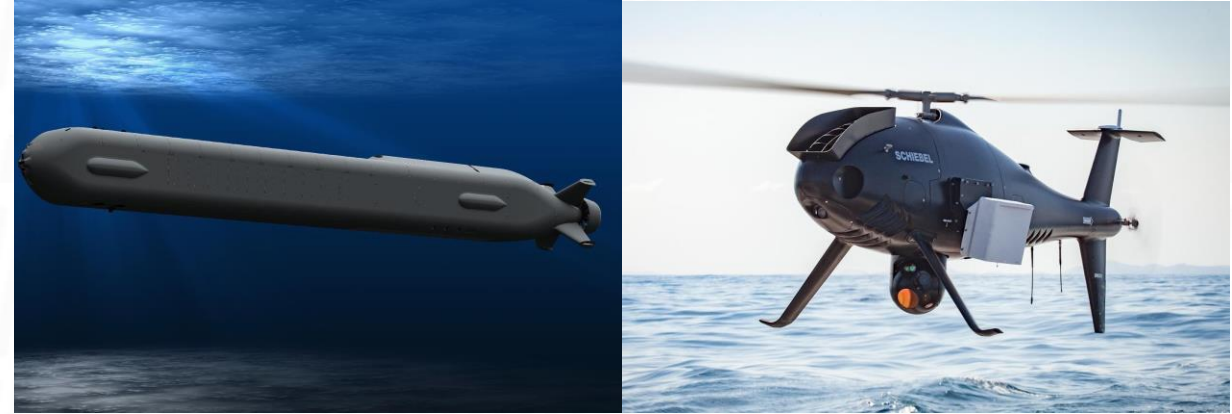
eLORAN: Proven Performance on Air, Land, Sea

Performance Specification	eLoran	GPS/GNSS
Signal Strength	1,000,000 watts	50 watts
Accuracy at Sea & Land	≤10m 95%	≤5m
Timing Accuracy (Max dev.)	12.5 nanoseconds to UTC	8 nanoseconds to UTC
Availability	99.9%	95%
Urban Canyons Coverage	Yes	No
Underground Coverage	Yes	No
Underwater Coverage	Yes	No
Mountain/Canyon Coverage	Yes	Limited
Polar Coverage	Yes	Limited



Goals of eLoran Trials/Testing (USG, Int Govt, Comm. Users)

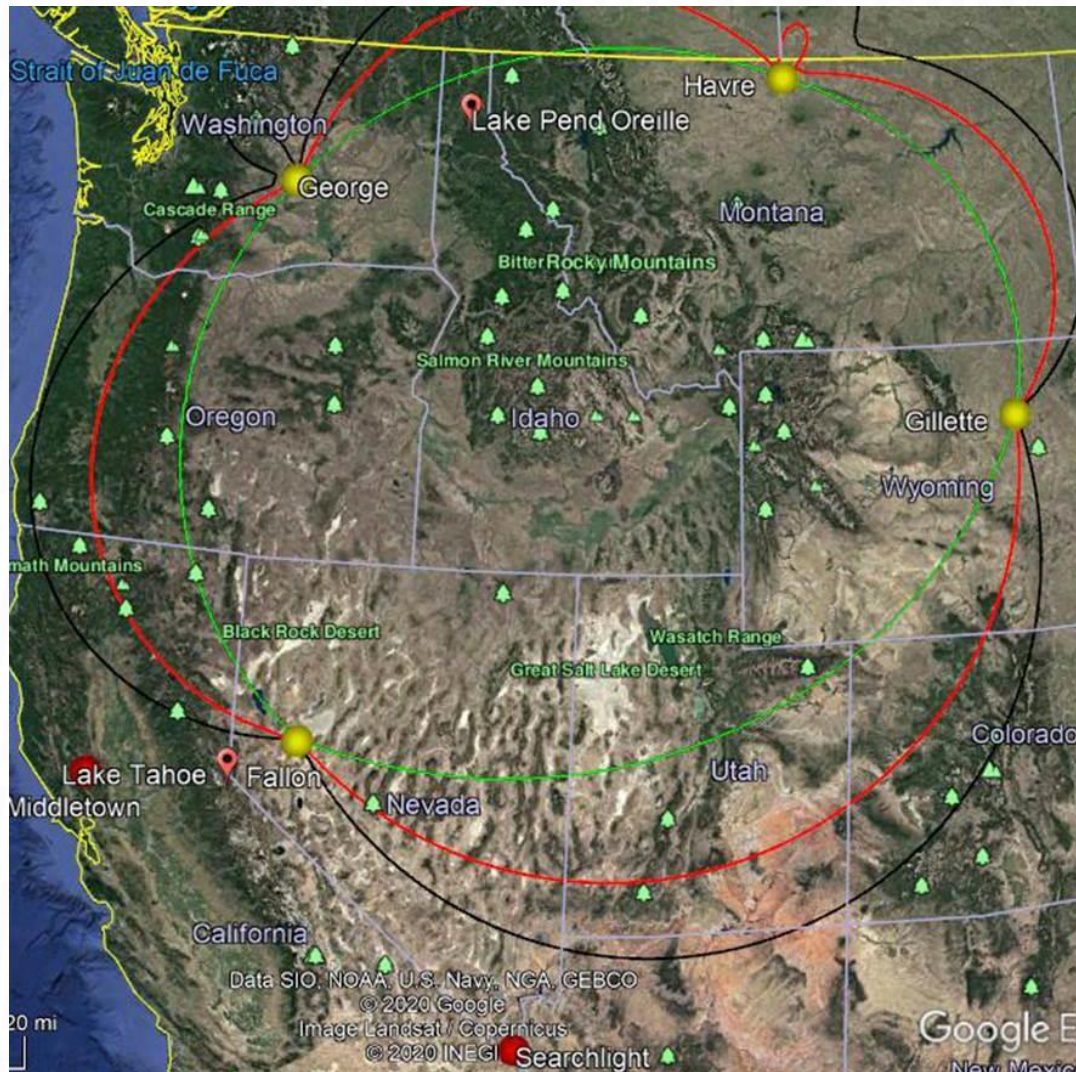
- Validate **eLoran meets user requirements** for arctic region PNT needs in denied environments
- **Assured navigation** of all UAS (Air, land, sea, subsurface)
- **Timing trials** for timing users & comms
- **Underwater** trials for UUVs
- **Under ice** trials for UUVs
- **Encrypted comms** demonstration with LDC
- Collect **users interface** requirements
- International **partner demonstrations**
 - Host the ICE partners to see/participate in trials
 - Additional US & international partners as agreed with ICE team (ie, SOCOM, UK, South Korea, etc)
- Commercial **partner/customer** demo's
 - ie, aviation, telecom, autonomous, IoT



Our Team in Action: August 2020 Test Wildwood



ICE PPR/Hellen Systems eLoran Trials Opportunities



- Locations for Testing of Capabilities
- Underwater/Ice Testing
 - Lake Pend Oreille: surface/subsurface
 - Red Fish Lake: Other?
 - Lake Tahoe (potentially)
 - Other glacial lakes in coverage area are viable
- UAV/Drone/Vehicle Testing
 - Nevada/Idaho range
 - Boise ID & other
- Commercial testing – prime candidate for urban time in San Francisco, other sites
- Timeline: January/February 2022

Trial Event Opportunity for ICE PPR & Broader Arctic Community

- Hellen team will aggressively promote this event to bring more users
- Championing as a “ICE PPR lead, all welcome” trial event
 - Already have interest from:
 - FAA, NASA, AFRL Dayton, DoD CIO
 - United Kingdom, Sweden
- Commercial Users interested in participating and “testing their toys”
 - Verizon, AT&T (network timing)
 - Telematics (vehicle tracking)
 - Drone/UAS/UAM participants (unmanned systems)
- Would/How does ICE PPR want to promote/expand this opportunity?

Contact Vehicle for Execution – SBIR Phase 3

- Phase 1: US Air Force STTR: Nov 2020-May 2021
 - Phase 1: Feasibility program on integrated GPS/eLoran user equipment: **Co-detection, handover, cooperative capabilities, integrated operations**
- Phase 2 SBIR – Integrate our research into **software and user equipment** for use during the Western States trials – **Need AF sponsor** (no money required, provided by AFWERXS)
- Phase 3 SBIR as Contract Vehicle to Perform eLoran Trials – through AFWERXS & GSA
 - Hellen Systems can submit an **SBIR Phase 3 proposal to perform trial**
 - To execute the Phase 3, Hellen Systems needs a **US Govt sponsor**
 - Do not need to bring money for the full trial, just be willing to sponsor the award and fund minimal amount (\$50,000)
 - Takes approximately **3 months to establish**, then ready for work
 - Can **accept foreign funding** or private funding
 - Can be used for **study, demonstration or even deployment** of systems/technology
 - Has **unlimited contracting ceiling**, sole source, and flexible task order contracting authority
 - Task orders with any USG agency
- We can utilize this vehicle for trials and have follow on task order for additional work as needed

Next Steps for eLoran Trials

- We would like to initiate these activities as soon as possible to meet program schedule
- Please contact us if interested in participating as a sponsor or end customer
 - For Phase 2, must be Air Force
 - For Phase 3 can be any USG/DoD agency
 - No limitation on end users or participants
- Questions?
- Contact information: Bridge Littleton, bridge.Littleton@hellensystems.com
571-276-7730