

NEW ERA FOR A NEW LORAN

IN THE LAST SEVERAL YEARS, WHILE the United States migrated away from a sole-means GPS approach to critical infrastructure operations, Loran has changed, as well. It has rapidly evolved into a modern system that can provide unprecedented capabilities as a global navigation satellite system (GNSS) backup. The Federal Aviation Administration (FAA) has identified Loran as “the best theoretical backup” to GPS, and rigorous studies of a modern Loran system have removed the “theoretical” qualifier. Today, we enter a new era for Loran, now dubbed “enhanced” or e-Loran.

yet been made public, earlier Loran economic studies were positive.

Congress has provided approximately \$120 million to bring Loran into the digital world, and the result should be a model for cost-effective use of government resources. After modernization the e-Loran system will cost about \$15 million annually—a remarkably small figure, since it will provide benefits to aviation, marine, terrestrial and timing applications, benefits that single-modal systems cannot provide.

DoT will use the Loran technical and economic studies to decide its future. A decision was expected in July. Other government documents have set the stage for the decision. A January 2004, DoT report stated: “If enhanced Loran meets the aviation NPA and maritime HEA performance criteria, and is cost-effective across multiple modes, the federal government should operate Loran as an element of the long-term radionavigation system mix.” That report also identifies Loran as a backup for automatic dependent surveillance–broadcast (ADS-B). Finally, the report suggests exploring the collocation of GPS augmentation and Loran facilities, which would not only maximize synergies, but also minimize costs.

The Loran decision will set an important global precedent. Several European countries now are reconsidering their Loran position. France will expand its system, and the UK will install a Loran transmitter this fall. The Royal Institute of Navigation (RIN) also has endorsed Loran, stating GNSS never should be used alone in safety critical situations. RIN identified Loran as the best backup for all modes of transportation.

Significant interest also exists in other parts of the world. At a meeting in Japan last fall, representatives from Japan, China, Korea, Russia, Europe and the United States addressed the question of GPS vulnerabilities. Virtually the entire conference focused on one system: Loran.

Because Loran is multimodal, manufacturers can develop core e-Loran technologies appropriate for multiple markets, just like GPS. Multiple markets mean economies of scale, lower prices for the users, and better cost/benefit for providers. GPS/Loran integration work already is under way for aviation, marine and timing applications, and e-Loran studies have demonstrated that integrated systems can provide better accuracy, availability, integrity and continuity than any one technology. ■

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There are national concerns beyond aviation behind the movement towards e-Loran. In a 2003 agreement FAA, the U.S. Coast Guard (USCG) and U.S. Department of Transportation (DoT) “acknowledged that GPS is, indeed, vulnerable to intentional and unintentional interference and that backup systems are required...” The agreement also identified Loran as a good timing source. Precise timing, essential to the secure and continued operation of the telecommunications, power and financial infrastructures, is mainly based on GPS.

From an aviation perspective, Loran is an area navigation (RNAV) system like GPS. Future navigation and landing procedures would be consistent between GPS and e-Loran, which is why e-Loran has to meet required navigation performance (RNP) standards for non-precision approaches (NPAs). RNAV is key in the transition from the current, highly structured air traffic control system to the future “free flight” system envisioned by FAA. Loran also is an obvious candidate to back up GPS because it is the only other multimodal system, does not share vulnerabilities with GPS, and is inexpensive.

A team of experts assembled by FAA and USCG has performed technical evaluations to determine if e-Loran could meet FAA’s NPA requirements and USCG harbor-entrance and approach (HEA) requirements, as well as provide additional benefits, such as timing. An FAA and USCG report on that Loran evaluation, completed in March 2004, states “that the modernized Loran system could satisfy the current NPA, HEA and timing/frequency requirements in the United States and could be used to mitigate the operational effects of a disruption in GPS services, thereby allowing the users to retain the benefits they derive from their use of GPS.” Meanwhile, DoT’s Volpe Center conducted a cost/benefit analysis of Loran, and though the results have not