Transition Strategy for Navigation and Surveillance

Extract from an Executive Summary of the document entitled

GPS Backup
For Position, Navigation and Timing

Transition Strategy for Navigation and Surveillance
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EXECUTIVE SUMMARY

On 11th September 2001 we saw the need for reliable safety, security and social support networks and services. Almost exactly four years later, the even more widespread devastation by hurricanes on the US Gulf Coast pointed out again the need for robust and resilient backbone infrastructures to protect the public health and wellbeing. These events show the effects of cascading unavailability of goods and services that are necessary or customary – at least, expected or assumed – in the American model of governance and economics.

Hurricanes Katrina and Rita in particular offer insight into what happens when communications, transportation and public safety are all removed. Our social fabric is revealed as a rather fragile set of agreed-upon behaviors, supported by what we now call critical infrastructure. Remove that basic foundation, and the ugly products of opportunism and desperation set in. America’s social and economic wellbeing is dependent upon certain critical infrastructures, power, water, communications, transportation, financial, and our ability to continue to
provide vital Government services in the presence of disasters, whether man-made or natural. One of those vital services is PNT or Positioning, Navigation and Timing.

The FAA’s Navigation and Landing Transition Strategy, published in August 2002, defined the satellite navigation transition strategy that considered the vulnerability of the Global Positioning System (GPS) and described proposed requirements for a backup navigation and landing capability for the National Airspace System (NAS).

The report also provided input to the Department of Transportation’s action plan to maintain the adequacy of backup systems for critical transportation applications in which GPS is being used. The strategic transition ensures that adequate ground-based navigation aids (navaids) are maintained and that the appropriate mix of systems is described that addresses GPS vulnerabilities. This paper picks up where the previous strategy ended and updates information, especially on changes to Loran, and examines the other possible backups to GPS, mainly inertial navigation systems augmented by additional distance measuring equipment (DME) and a minimum operating network of existing very-high frequency omni-directional range (VOR). This paper is organised by first providing high-level requirements for continuing operations in the event of GPS interference. It then discusses navigation performance in various flight domains, updates the status of Loran, compares options for backup in terms of cost, discusses strategies for ADS-B, and recommends a transition path to implementing a backup strategy. Throughout the paper, the history and evolution of public policy is discussed. Public policy is the remaining link in deciding a backup strategy.