

Increasing Safety

Watts Antenna Company notes that, in press treatments of the Ground Based Augmentation System (GBAS), the term 'safety-critical' often appears as a prefix. Since GBAS is frequently cited as the NextGen successor to Instrument Landing Systems (ILS), the inference could be taken that ILS is in some way unsafe. Nothing could be further from the truth. The fact is, not one fatality can be attributed to ILS malfunction in over seventy years of operations. Few technologies can match ILS' safety record.

Moreover there's something inherently unfair and, from a public policy standpoint, imprudent about comparing the spotless track record of an operational NowGen technology, ILS, with the anticipated features of as-yet theoretical successors such as NextGen GBAS and WAAS-augmented GPS.

This industry presumptuousness was on display, for example, in an IEEE Xplore paper, [In GBAS CAT-I Safety Assessment – First Achievements](#), wherein Eurocontrol's Eric Perrin cites (among others benefits) the "principal safety benefits of GBAS CAT-I operations compared to ILS operations" to include:

- More stable signal, and less interference with preceding aircraft.
- Significant benefit where no ILS is available could lead to higher proportion of precision approaches.
- Reduced maintenance and flight inspection requirements - potential for fewer errors during maintenance.

With respect to the above three points, Watts Antenna Company feels its advanced ILS products mitigate all these perceived safety shortcomings with reduced multipath effects.

The FAA acknowledges, in its GNSS Library of [Frequently Asked Questions](#), the accuracy shortcomings of GPS versus ILS. In response to Question 13 "*How do GPS accuracy and integrity compare to that of existing ground-based navigation systems such as VOR/DME?*" it says:

"The basic GPS signal is not as accurate as the existing ILSs; however, augmented by WAAS and LAAS, GPS will be able to supply a precision approach capability (CAT-I with WAAS and progressing to CAT-II/III with LAAS)"

In its October 2006 report, "*Vulnerability Assessment of the Infrastructure that Relies on the Global Positioning System (GPS)*", the Office for Space-Based Positioning, Navigation, and Timing reported, among other things that "*GPS augmentations (e.g., WAAS, NDGPS) improve performance, but will not mitigate*

the loss of the basic GPS signal.” and that the “growing use of GPS [will] encourage a disruption industry.”

This report goes on to cite “Unintentional interference” such as:

- Radio Frequency Interference (RFI)
- GPS testing
- Ionospheric; solar max
- Spectrum congestion

As well as “Intentional interference” such as:

- Jamming – denial of use
- Spoofing – counterfeit signals
- System damage of the GPS constellation, ground control segment

None of these interference issues can be taken lightly. Together, they point to the unavoidable vulnerabilities of any space-based navigational system, no matter how sophisticated. Even short-duration satellite outages can have catastrophic safety effects.

Fundamentally, this report continues, there are “inherent vulnerabilities in all systems that use radiofrequency spectrum.” Watts concurs with this assessment, but would further assert that there are even *greater* vulnerabilities inherent in *space-based* radiofrequency spectrum. ILS, while certainly an RF application, avoids satellite risk entirely.

Alas a healthy regard for satellite risk is not always the rule. For example in its November 2008 Fact Sheet, “*WAAS Instrument Approaches Now Outnumber Instrument Landing System Approaches*”, the FAA appears to be discounting the need for, at a minimum, a ground-based back-up system such as ILS when it asserts, “the WAAS signal is provided from space so there is no need for the FAA to install and maintain navigation equipment at an airport, such as that needed for an ILS.”

Former FAA Administrator (under the Carter Administration) Langhorne Boyd struck a more measured response in a 1998 submission to the [The DOT/DOD Users Review of the FEDERAL RADIONAVIGATION PLAN](#) when he suggested that, even in a GPS-centric environment:

“ILS is the last critical navaid in aircraft flight, permitting the plane to return safely to the ground, even in otherwise lethal weather. Because the alternate/back-up system must cover every phase of flight, full ILS service must be maintained.”

National security is all about safety in the largest possible sense. Watts Antenna Company firmly believes ILS is an indispensable component of aviation safety strategy, in this generation and the next.

Watts is making NextGen happen *now*.