Legal Issues including Liability associated with the Acquisition, Use, and Failure of GPS/GNSS

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It is now clear that Global Positioning Systems (GPS) will be the primary navigational and positioning tool used as we move into the 21st century. As a result of the continued expansion and development of GPS, concerns have been voiced about the liability associated with development, construction, and use of the system. No short paper can explore all of the various liability issues associated with GPS. However, this paper will touch upon various liability issues in the hope that this analysis will continue with the development of GPS.

1. INTRODUCTION. Because of the ability of the Global Positioning System (GPS) to provide accurate positioning, the trend of eliminating other ground-based navigational systems will continue.[1] Presently, the GPS Standard Positioning Service (SPS) is available to civilian users but the signal is generally degraded due to selective availability (SA). On 29 March 1996, Vice-President Al Gore, on behalf of the President, announced United States Policy on GPS. The policy makes two significant statements about the future: (1) the US Government intends to discontinue the use of SA within a period of four to ten years; (2) the US Government will continue to offer public access to GPS 'for peaceful, civil, commercial, and scientific use, on a continuous worldwide basis free of direct user fees'.[2] Additionally, there is a continuing discussion about a Global Navigation Satellite System (GNSS) that would be civilian controlled and regulated.[3] Initially it would use unregulated signals from GPS for fixing positions and navigation until a civilian controlled satellite navigation system is developed and put into place. Obviously this system would parallel the current GPS constellation of satellites together with ground-based augmentation systems to allow for precision navigation for aircraft, ships, and land-based vehicles.

2. CLAIMS AGAINST THE UNITED STATES. The United States and most foreign governments enjoy sovereign immunity from tort claims. Thus, unless a claim is made under a statute allowing recovery against a government for negligent or wrongful acts, it will usually be dismissed. Under the Federal Tort Claims Act (FTCA),[4] the United States Government has waived immunity for claims for money damages where the loss is caused by the negligent or wrongful act or omission of a government employee acting within the scope of his office. Claims must be brought in the Federal Court based upon the Law where the negligent or wrongful act occurred. Although claims are allowed against the Government by this statute, there are several areas where immunity is not waived. First is the so-called, 'discretionary

function' exception.[5] What this essentially means is that, if the Government engages in an activity which is not required, any negligent or wrongful act resulting from that discretionary activity is not actionable. However, because of the difficulty in differentiating 'discretionary' from required government 'operational' functions, courts have limited the availability of this exception. Specifically, in *Ingham v. Eastern Airlines*[6] the Court held that the failure of an air traffic controller to provide accurate weather forecasts was the proximate cause of the crash. The Court stated that, while establishment of an air traffic system was discretionary, once established, employees are required to act in a reasonable manner, and the Government was liable for failure to do so. Clearly then, once the United States Government provides a GPS signal for civil use, it is reasonable to conclude that the Government would be liable if the failure of the signal was the *proximate cause* of a crash. It is important to note, however, that a decision to continue providing GPS signals at a particular level of accuracy would generally be construed as a discretionary act. But once continued, the necessary maintenance and proper signal adjustments would be 'operational'.

At this juncture two points must be considered. First, there have been no reported cases holding the US Government responsible for failure of aviation navigational aids such as VOR, ILS or nondirectional beacons.[7] Secondly, it is important to understand the concept of comparative negligence which exists in most States of the USA and within some Federal statutes.[8] Essentially, comparative negligence allows a court to weigh the respective fault of *both* parties when an accident causing damage or injury occurs. Should the plaintiff be more than fifty percent at fault, recovery is usually denied. As an example, if an ILS is not fully operational and the pilot fails to identify the station properly prior to commencing the approach and/or fails to review his other instruments to detect the ILS failure, ordinarily the pilot is considered more negligent than the Government as a result of the signal failure.

Also, under the FTCA, the Government does not waive immunity where claims arise in a foreign country.[9] Although this could limit recovery for accidents in foreign air space, Kevin Spradling in his analysis states that where a claim arises is not always the scene of the accident.[10] This analysis dovetails with the *In re Paris Air Crash of March 3, 1974* case.[11]

The final exception to recovery under the FTCA relates to injuries suffered as a result of combat activities of the Armed Forces during a time of war.[12] While in the first instance it does not appear directly related to GPS activities, it is important since the exception may completely negate US Government liability if the United States is forced to turn off the civilian GPS signal in a national emergency. This is one of the issues that has prompted the call for development of a global navigation satellite system under international civilian control.[13]

The next area of possible recovery against the United States is under the Suits in Admiralty Act.[14] This act waives sovereign immunity of the United States where injury is caused on the high seas and navigable waters of the United States. To bring a suit successfully, the plaintiff must show Admiralty Act jurisdiction. The case of *Sisson v. Ruby*[15] itemizes the criteria for Admiralty jurisdiction: (1) that the accident arose on the high seas or navigable waters of the United States; (2) posed a potential threat to maritime commerce; and (3) was substantially related to traditional maritime activity. Ordinarily, the Act is limited to ships, other water craft, and some over-water flights.[16] Although the Suits in the Admiralty Act do not contain a discretionary function exception, some courts have implied it.[17] However, like the

FAA cases, when the Government undertakes to perform a function such as maintaining lighthouse lights – when the lights go out – the Government has been held liable.[18]

Two other acts worthy of mention are the Foreign Claims Act[19] and the Military Claims Act.[20] Both are similar in that they do not waive sovereign immunity, *per se*. If inhabitants of foreign countries are injured, or there is property damage from non-combat activities caused by members and/or civilian employees of US Armed Forces, whether or not they are acting within the scope of their official capacity, the Foreign Claims Act allows settlement of those claims. The Military Claims Act provides relief for US citizens and others who do not fall under the Foreign Claims Act. The US government has no legal obligation to pay under these Acts but has been generous in payment nonetheless.[21] These Acts may play a significant role in a claim against the Government especially if military members or civilian employees of the military engage in negligent GPS maintenance and calibration overseas.

3. INTERNATIONAL LAW. Presently there are no *direct* mechanisms or agreements by which a party can hold the United States liable for faulty GPS signals.[22] One International Agreement which may create a basis for liability is the 1967 Outer Space Treaty.[23] This Act holds nations and their Non-Governmental Agencies liable for damages caused by objects placed in space. Article VII of the Treaty deals with direct physical damage occasioned by space craft. Article VI, although somewhat vague, provides that parties '… shall bear international responsibility for national activities in outer space…'.[24] Unlike the Outer Space Treaty, the 1972 Convention on International Liability for Damage Caused by Space Objects[25] states that '[a] the launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight'.[26] In its simplest terms, the Convention was intended to take care of claims, other than physical damage claims, caused by a malfunctioning satellite or launch vehicle that does not burn up on re-entry.[27] Commentators suggest that it is doubtful that the Convention would apply to radio signals. Spradling, in his analysis of liability issues, states that the US would probably refuse to recognise the validity of a claim filed against them for damages arising indirectly from incorrect GPS data.[28] However, others argue a claim should be allowed under the Convention if proximate cause can be proven.[29]

Although US Government liability may be limited by statutes, treaties, and conventions, under US law, 'the US has a duty to warn civil users of problems with the system that can have an adverse impact on them'. This can result from operational negligence, Selective Availability (SA) policies, as well as '… the current inability to detect and report in real time certain anomalies for fifteen to twenty minutes, or more…'.[30] Additionally, improper maintenance or entry of false data compromising the integrity and accuracy of the GPS system are other negligent or wrongful acts which can lead to liability.

In conjunction with satellite signals, future increased accuracy of GPS will rely upon Wide Area Augmentation Systems (WAAS) and Local Area Augmentation Systems (LAAS) to allow precision approaches at airports. These are in addition to differential GPS (DGPS) which also provides ground reference stations at known geographic locations to enhance GPS accuracy. Although augmentation systems will not have to be placed at each and every airport or harbour, proper maintenance and calibration of these ground-based units used in conjunction with satellite signals will

be necessary. As noted, although installation of these ground-based units can be construed as a discretionary function of the Government, once it undertakes this activity, it becomes an operational function.[31]

4. MANUFACTURING LIABILITY. GPS equipment manufacturers (satellites and receivers), like any goods manufacturer, may be liable either under traditional negligence theories or may be liable under the rules of strict liability. Generally, a manufacturer is strictly liable in tort when an article is placed on the market knowing that it is to be used without inspection for defects or proves to have a defect that causes injury to a human being.[32] The thrust of this concept is to ensure that the costs of injuries resulting from defective products are borne by the manufacturers who put such products on the market. Additionally, under US law, liability may be maintained for a breach of warranty even though there is no privy of contract between the parties.[33] Because private companies do not enjoy the sovereign immunity applicable to the United States Government, the ability of a plaintiff successfully to recover from injuries caused by defective products is significantly enhanced, again, subject to any comparative negligence.[34]

5. BRIEF EXAMPLE OF POTENTIAL PUBLIC AND PRIVATE LIABILITY. One un-reported incident of interest which highlights the subject of intentional or unintentional GPS signal interference and the potential for both public and private liability occurred in January of 1998. A number of flight crews complained about loss of GPS signals in the vicinity of Albany, New York. Some FMS/GPS receiver integrity monitoring systems were not notifying the crews of the problem resulting in aircraft heading changes of up to ninety degrees. Interestingly, some FMS systems reinitialized after reacquiring the satellite signals, sending the aircraft direct to Silicon Valley, California, the manufacturer's location. This was 'E.T.' revisited since the GPS receivers were programmed to go 'home' if signal instability occurred. Although most GPS receivers will report signal loss, the rebooting of the system caused it to head 'home'. It is clear that this anomaly could significantly affect safe air traffic separation.[35]

When this problem was investigated, it was determined that the Rome Laboratories, a government contract facility was, in fact, propagating signals which caused the GPS interference. In this instance, had there been a mid-air collision not only would the Government have been subject to suit under the Federal Tort Claims Act, but very likely the manufacturer of the GPS receiver would have incurred civil liability because of the anomaly within the internal GPS program. The suit against the equipment manufacturer would not be subject to sovereign immunity and would be decided in accordance with the general rules of United States tort liability if the accident occurred within the United States.[36]

6. CONCLUSION. Along with the United States most nations enjoy sovereign immunity that bars tort actions for negligence occasioned by Government employees or agencies. Additionally, in the United States plaintiffs may be barred from claims against other governments by the Foreign Sovereign Immunities Act of 1976.[37] This statute bars suits against other countries unless the claim falls within specific, limited exceptions. Also, private US equipment manufacturers (those building GPS satellites or GPS receivers) may not fall under the jurisdiction of foreign nations since the assembly of same is usually completed in the United States.

It is clear that, over time, the United States will continue to relinquish absolute control of GPS, as it has other navigational systems such as Omega and Loran-C.[38]

However, whether an international organization is prepared to assume the responsibilities and costs of continued development and maintenance of such a system is unknown. Many countries will balance the likelihood of the United States shutting down the GPS signal against sharing those burdens. GPS continues to march forward as the primary navigation system on land, on water, and in the air. Ground-based augmentation systems will allow more precise use of the GPS signals and will enhance integrity of service. Although the international community will continue to develop international standards for GNSS systems, it is unlikely that the international legal system will keep pace. Sovereign immunity together with political reality means that any financial recovery for faulty or interrupted signals will continue to be amorphous. As noted, there has never been a successful reported recovery against the United States Government for a malfunctioning ground-based aviation navigational aid. Without significant international institutional change, including specific treaties and conventions mandating strict liability, there is no reason to believe that this will change with GPS.

REFERENCES

[1] FAA. (1998). 'Lurking concerns about deliberate or natural interference with radionavigational signals from the Global Positioning System (GPS) is causing a major change of thinking at the Federal Aviation Administration.' *Inside FAA*, Vol. 2, No. 3 (February 6, 1998). 'There surely is a perception that GPS, even with WAAS, is not as bulletproof as they had envisioned it to be, and the architecture is not as robust as they thought it would be.' *Id.*

[2] Office of Science and Technology Policy, National Security Council, U.S. Global Positioning System Policy, March 29, 1996.

[3] Telematics Project (TR1027), Siemans Plessey Systems. GNSS1 will constitute a quasi-civil satellite navigation system. In the future, GNSS2 is intended as a completely civilian controlled satellite navigation system.

[4] 28 U.S.C.A. (1988). §§1346(b) et. seq.

[5] 28 U.S.C.A. §2680(a).

[6] 373 F.2d 227 (2d Cir.) *Cert. Denied*, 389 U.S. 931 (1967).

[7] Telephone interview with Andrew J. Dilk, Esquire, Manager, Accident Counsel Branch, FAA, July 1998. There is one U.S. reported GPS case, *Connaghan v. Maxus Exploration Co*., 5 F. 3d 1363 (10th Cir 1993) which involves survey mapping using GPS. Recovery was denied.

[8] The Military Claims Act, *infra*, Note 20, specifically references this legal rule.

[9] 28 U.S.C.A. §2680(k).

[10] Spradling, Kevin K. (1990). The international liability ramifications of the U.S. NAVSTAR Global Positioning System. In *Proceedings of the Thirty-Third Colloquium on the Law of Outer Space*, 93.

[11] 399 F. Supp 732 (Cal. 1975). *In Paris*, the plane crash occurred in France. This did not bar suit in the United States because the wrongful Act was alleged to be approval of a Certificate of Inspection in California.

[12] 28 U.S.C.A. §2680(j).

[13] *Aviation Week & Space Technology*, January 3, 1994, at Page 32; See, Note 3, *supra*. Transportation, Defense Departments reach accord on GPS use. Query: Is it not reasonable to assume that the United States military could develop a system to jam or interfere with the 'civilian' GNSS signals if national security is at stake?

[14] 46 U.S.C.A. §§741–752 (1988).

[15] 497 U.S. 358 (1990).

[16] *Miller v. United States*, 725 F. 2d 1311 (11th cir. 1984), *Cert. denied*, 469 U.S. 821 (1984).

[17] *Drake Towing Co., Inc. v. Meisner Marine Construction Co*., 765 F. 2d 1060 (C.A. 11 ALA 1985).

[18] *Indian Towing Company v. United States*, 350 U.S. 61 (1955).

[19] 10 U.S.C.A. §2734 (1996).

[20] 10 U.S.C.A. §2733 (1996).

[21] Claims under both Acts are currently limited to $100,000 unless special government approval is obtained.

[22] Epstein, Jonathan M. (1995). Global Positioning System (GPS); defining the legal issues of its expanding civil use, 61 *Journal of Law and Air Commerce*, 243 at 268 (Sept.–Oct. 1995).
[23] 18 U.S.T. 2410 (1967).
[24] *Id*, Article VI.
[25] 24 U.S.T. 2391 (1972).
[26] *Id*, Article II.
[27] Claims were made as a result of the disintegration of the Cosmos satellite which blanketed a large area of Northern Canada with radioactive particles.
[28] Spradling, *supra*, Note 98.
[29] Larsen, Paul D. (1993). Legal liability for Global Navigation Satellite Systems. *Proceedings of the Thirty-Sixth Colloquium on the Law of Outer Space*, 69.
[30] Spradling, *supra* at 99.
[31] Congressional concerns about WAAS may impact its future funding and implementation. A recent Senate Bill restricts the use of funds for WAAS until both the Secretary of Transportation and the FAA Administrator certify that: (1) WAAS is a sole means of navigation; (2) signal continuity issues have been solved; and (3) the WAAS cost/benefit ratio exceeds that of other landing and navigation aids. *Aviation International News*, Vol. 30, No. 14, Page 1 (September 1, 1998).
[32] *Greenman v. Yuba Power Products*, 377 P. 2d 897 (1963).
[33] *Martin v. Julius Dierck Equipment Co*., 374 N.E. 2d 97 (1978); See also, Uniform Commercial Code §2–318.
[34] *AETNA Casualty Insurance Co. v. Jeppesen Sanderson Co*., 642 F.2d 339 (1981).
[35] FAA Incident Summary, New England Region, January 30, 1998; See also, Note 1, *supra*.
[36] These rules are: (1) The Defendant owes a duty to the injured party; (2) the Defendant breached that duty; and the breach of duty was the proximate cause of the Plaintiff's injuries and/or damages. Along with traditional theories of negligence is the doctrine of Res Ipsa Loquitur ('the act speaks for itself'). Briefly stated, this doctrine provides that where an instrumentality involved in an accident is within the exclusive control of the defendant and where the accident is one which would ordinarily not have happened in the absence of negligence, then it may be inferred from the mere happening of the accident that the defendant was negligent. Res Ipsa Loquitur has been described as nothing more, and nothing less, than 'a common sense appraisal of the probative value of circumstantial evidence'. See, *Foltis, Inc. v City of New York* 38 N.E. 2d 455 (1944); *Northwest Airlines, Inc. v. Rowe*, 226 Fed. 2d 365 (8th Cir 1955).
[37] 28 U.S.C.A. §1330 (1988); See also, *Forsythe v. Saudi Arabian Airlines*, 885 F.2d 285 (1989).
[38] John M. Beukers, *Administrative Procedures & Agreements Governing Global Radionavigation*.

KEY WORDS

1. GPS/GNSS. 2. Law.