



Does GPS Make Us Vulnerable?

By Vincent Pica
District Commodore, First District, Southern Region (D1SR)
United States Coast Guard Auxiliary

GPS is used in many diverse areas, including boating, farming, aviation, public safety, disaster relief, and recreation, along with its military purpose—to provide precision navigation and timing to our combat forces. Does the widespread use of GPS in so many areas of commerce, industry, and private life actually expose us to GPS vulnerability, both foreign and domestic?

First and foremost, GPS is a military imperative. Civilians benefit from its enhancements, but it has to work for our armed forces on land, at sea, and in the air. As military requirements increase, so do the capabilities of GPS. Yet as the current GPS system is unable to effectively serve our armed forces' needs, GPS-III is being put aloft, requiring an entirely new ground control system. The Air Force began the process in 2010 when it awarded a contract to Raytheon Company for the Next Generation GPS Control

Segment, now referred to as OCX. According to Lt. Col. Deanna Burt, 2nd Space Operations Squadron Commander at Schriever Air Force Base in Colorado, "OCX is the new ground system that will replace our current Architecture Evolution Plan ground system. OCX is critical for us, as we cannot fly GPS III satellites with our current ground system." The contract includes the development and installation of hardware and software at GPS control stations, as well as the deployment of advanced monitor stations at remote sites to allow for command and control of additional satellites. "OCX is also meant to fly up to 64 satellites, where our current system can only fly up to 32 satellites," said Commander Burt. This modernization won't leave current GPS satellites "flying blind." OCX will maintain compatibility with the current satellite constellation and enable new, modernized signal capabilities (a winning combination).

A meeting at the National Physical Laboratory in Teddington, UK, focused on the increasing vulnerability of global GPS systems to those who would jam the systems for their own goal or gains. "GPS gives us transportation, distribution industry, 'just-in-time' manufacturing, emergency services operations—even mining, road building and farming—all these and a zillion more," David Last, a consultant engineer and former president of the Royal Institute of Navigation, told the conference. "But what few people outside this community recognize is the high-precision timing that GPS provides to keep our telephone networks, the Internet, banking transactions, and even our power grid online." (Read more about the conference here <http://news.bbc.co.uk/2/hi/science/nature/8533157.stm>.)

Last notes that, "Each satellite in a sat-nav constellation is putting out less power than a car headlight,

illuminating more than a third of the Earth's surface at a distance of more than 20,000 kilometers." This is what makes it possible, if not easy, to jam GPS signals. Our enemies try to suppress our GPS abilities and our U.S. military fights against it in the same way.

Besides being vulnerable to blinding by a strong, noisy signal, GPS receivers can also, alarmingly, be "spoofed" by

fraudulent broadcast GPS signals into thinking their locations or times are different. Someone with nefarious intentions can buy a simulator, link it to Google Earth, put it on a route, and simulate that route to the GPS. "A GPS receiver overcome by [a fraudulent signal] will behave as if you're travelling along that route," said Last. Admittedly, this isn't as easy as it may sound, but it is certainly possible for determined terrorists.

the existing U.S. GPS and Russian Glonass systems, and the forthcoming European sat-nav effort, Galileo, are all equally susceptible to jamming and spoofing.

While the elimination of threats to our national well-being is being addressed by the proper authorities, boaters need to know that the GPS they've come to rely on is not without its vulnerabilities. I always advise (sometimes to no avail) that if what's showing on your GPS isn't what you see outside your windshield, go with what you actually see outside your windshield. Don't ever be so reliant on technology that you cease trusting your own senses! ⚓

If you are interested in being part of USCG Forces, email me at JoinatUSCGAux@aol.com or go direct to the DISR Human Resources Department, which is in charge of new members matters, at DSO-HR and we will help you "get in this thing."

web+ See a GPS satellite launch



In the UK trial, GPS in the jamming zone (red triangle) reported positions tens of km away from the true (eLoran) position. Courtesy, BBC

The immediate solution to our vulnerability problems are not clear, since