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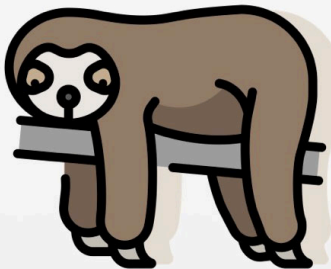
NEWS

A brief history of GPS

By Mark Sullivan

| AUG 9, 2012 7:00 AM PDT

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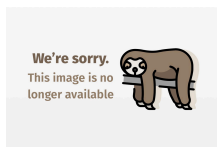


It all started with Sputnik. What seemed at the time like a major defeat in the Cold War, turned out to be the catalyst for one of the most important technologies of the 20th century, and maybe the 21st.

EXHIBIT

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It was October 4th, 1957. Scientists at MIT noticed that the frequency of the radio signals transmitted by the small Russian satellite increased as it approached and decreased as it moved away. This was caused by the Doppler Effect, the same thing that makes the timbre of a car horn change as the car rushes by.



The Russians launched the Sputnik satellite in 1957, surprising the world.

This gave the scientists a grand idea. Satellites could be tracked from the ground by measuring the frequency of the radio signals they emitted, and conversely, the locations of receivers on the ground could be tracked by their distance from the satellites. That, in a nutshell, is the conceptual foundation of modern GPS. That GPS receiver in your phone or on the dash of your car learns its location, rate of speed, and elevation by measuring the time it takes to receive radio signals from four or more satellites floating overhead.

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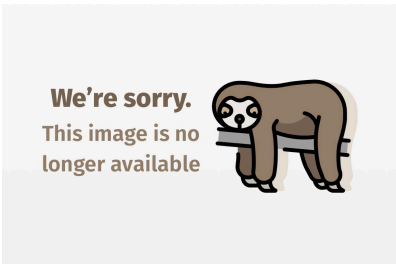
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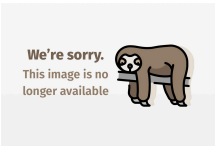
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1959 The Navy built the first real satellite navigation system, which it called TRANSIT. The system was designed to locate submarines, and started out with six satellites and eventually grew to ten. The subs often had to wait hours to receive signals from the satellites, but the model set the stage for true GPS with continuous signaling from satellites in space.



Currently, a total of 31 GPS satellites orbit the earth twice a day.

1963 The Aerospace Corporation completed a study for the military that proposes a system of space satellites that sends signals continuously to receivers on the ground and could locate vehicles moving rapidly across the earth’s surface or in the air. The study lays out the GPS concept that we know today for the first time: receivers in vehicles on the ground would derive a precise set of location coordinates by measuring the transmission times of radio signals from satellites.



The Air Force launched the first “Block I” GPS satellite into space in 1974.

1974 The branches of the military, after having worked on a GPS system for the past 11 years, launch the first satellite of a proposed 24-satellite GPS system called NAVSTAR. The satellite, and many to follow, are meant to test the NAVSTAR concept.

1978-1985 The military launches 11 more test satellites into space to test the NAVSTAR system, which by then was called simply “the GPS System”. The satellites carried atomic clocks with them, to more precisely measure

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1983 Shortly after the Russians shot down Korean Air flight 007 after it wandered off course into Soviet airspace over the Kamchatka Peninsula, president Reagan offered to let all civilian commercial aircraft use the GPS system (once it was completed) to improve navigation and air safety.

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1985 The government contracts with private companies to develop "airborne, shipboard and man-pack (portable)" GPS receivers.

1989 After years of testing, the Air Force finally launches the first fully operational GPS satellite into space. The Air Force had planned to launch the satellite on the Space Shuttle, but changed its plans after the Challenger disaster in 1986 and used a Delta II rocket instead.

1989 Magellan Corporation claims to be the first to market in the U.S. with a hand-held navigation device, the Magellan NAV 1000.

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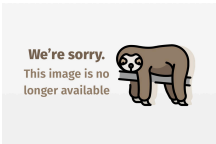
1990 Fearing military adversaries might use the GPS system to advantage, the Defense Department decides to deliberately decrease the accuracy of the system.

The first handheld consumer GPS device, the Magellan NAV 1000.

1994 The FAA and Bill Clinton tell the worldwide airline industry that can continue using the GPS system free of charge "for the foreseeable future."

1995 The first rev of the GPS system was finally completed in 1995 when the last of a full "constellation" of 27 fully operational GPS satellites is launched into space. Of those 27, three were used as spares to quickly replace any of the 24 active satellites that failed. The satellites, which weighed between three- and four-thousand pounds, circled the globe

1998 Vice President Al Gore announced a plan to make the GPS satellites transmit two additional signals to be used for civilian (non-military) applications, especially to improve aircraft safety. Congress approved the plan (called “GPS III”) in 2000.

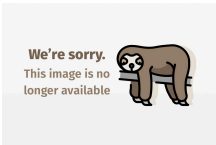


The Befefon Esc! was the first mobile phone with GPS built in.

1999 Mobile phone manufacturer Benefon launched the first commercially-available GPS phone, a safety phone called the Benefon Esc! The GSM phone was sold mainly in Europe, but many other GPS-enabled mobile phones would follow.

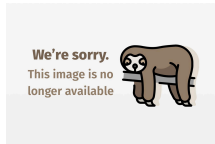
2000 The Defense Department ended the purposeful degradation of GPS, which it implemented before the first Gulf War. GPS became ten times more accurate overnight, and all kinds of industries—from fishing to forestry to freight management—soon began using it.

2001As GPS receiver technology got much smaller and cheaper, private companies began pumping out personal GPS products, like the in-car navigation devices from Tom Tom and Garmin.



Personal GPS devices like the TomTom Start 45 car navigation device became hugely popular shortly after the turn of the century.

2004 Qualcomm said it had developed and tested “assisted GPS” technology allowing phones to use cellular signal in combination with GPS signal to locate the user to within feet of their actual location.

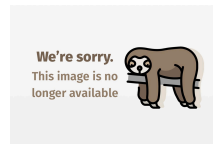


The first “Block II” satellite joined the GPS constellation in 2005.

2005 The first of a new generation of GPS satellite, called “Block II,” was launched from Cape Canaveral. The new breed of satellite transmitted signals on a second, dedicated civilian channel.

2009 The Government Accountability Office (GAO) issued a report warning that the \$5.8 billion effort to upgrade the GPS satellites was so fraught with technical problems, cost overruns, and delays that some of the satellites could begin to fail in 2010. This sent the Air Force scrambling to allay fears, saying “There’s only a small risk we will not continue to exceed our performance standard.”

2010-2011 The Air Force launched two new GPS satellites, one in 2010 and one in 2011, that are meant to keep the constellation operable until the next generation “Block III” satellites can begin launching in 2014. The new Block III satellites will add an additional civilian GPS signal, and will enhance the performance of existing GPS service.



The next generation of GPS satellite, called “Block III” will be activated starting in 2014.

2012 At present, the Air Force manages a constellation of 31 operational GPS satellites, plus three decommissioned satellites that can be

Air Force will launch the next addition to the constellation, the GPS IIF-3 satellite, into space.

Sources: *The Rand Corporation, United States Naval Observatory, United Launch Alliance, GPS.gov*

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