System Successes

When *GPS World* debuted in January 1990, 15 satellites had been launched, including the 10 prototypes of Block I satellites, and four of them had ceased operation. By the end 1995, 18 more had risen; with some decomissionings, this brought the total number of GPS satellites set healthy to 25.

BLOCK II
The 11th operating GPS satellite in orbit, GPS Block II-5, is activated on Jan. 6; the 12th is launched on Jan. 24.

DESERT STORM
A GPS-guided weapon, the conventionally armed air-launched cruise missile (CALCM), is used for the first time in Operation Desert Storm.

The GPS constellation experiences repeated delays in satellite launches.

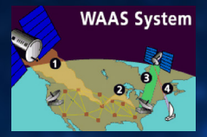
NAVCEN
Worldwide, 24-hour 3D + time coverage is achieved. The U.S. Coast Guard's GPS Information Center begins 24-hour watch standing.

IOC
The Air Force declares Initial Operational Capability (IOC).

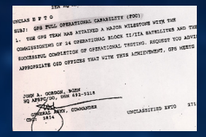
The Federal Aviation Administration (FAA) approves GPS use by civil aviation.

1991 October

"GPS users show an insatiable appetite for ever more precise data. Give them a mile and they want an inch."
— Hale Montgomery, *GPS World* columnist



WAAS FAVORED
The FAA cancels a microwave landing system in favor of GPS and releases an RFP for the Wide Area Augmentation System (WAAS).



GPS FOC
On April 27, the Air Force Space Command declares Full Operational Capability (FOC).

BLOCK IIF CONTRACT
A presidential decision directive (PDD) establishes the guidelines for dual use of GPS.

The GPS Joint Program Office awards a contract to The Boeing Company for Block IIF satellites.

IIR LAUNCHED
The first IIR satellite is launched. Congress approves a nationwide differential GPS (DGPS).

L2 SIGNAL
Vice President Al Gore announces a new civil signal on L2, centered at 1227.6 MHz.

The U.S. Department of Transportation (DOT) recommends extending the life of Loran-C beyond the end of 2000.

1990 1991 1992 1993 1994 1995 1996 1997 1998

Industry Advances

HANDHELD
Sony develops a GPS handheld receiver.

Trimble Navigation files for an initial public offering (IPO).

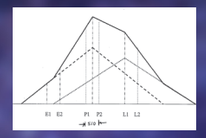
Pioneer Electronics Corp. offers the first GPS-based car navigation system, in Japan.

GPS World begins publication.

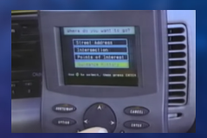
INDUSTRY SPEAKS
The U.S. GPS Industry Council is launched as an association of manufacturers and users to seek to promote commercial use of GPS and to address issues affecting those groups.

ENSIGN
Trimble announces a new handheld receiver for less than $1,000, the Ensign for mariners.

AT&T begins to use GPS for synchronization.



MUTIPATH
NovAtel's invention and patent of the narrow correlator technique allows receivers to significantly reject multipath signals and makes the company a key player in the industry.



INFOTAINMENT
General Motors announces its Oldsmobile 88 LSS models will have a GPS-based navigation/information system — the first in a U.S.-made car. The navigation system option costs $2,000.

POPULARITY
The 1996 Ford Lincoln Continental, the first car to have GPS-based vehicle location and cellular communications, is introduced. There are more than 1 million GPS receivers worldwide, with the number growing at 60,000 units per month.

GNSS/INS
CAST Navigation joins with Honeywell and Litton (now Northrop Grumman) to develop the Embedded GPS/INS Tester (EGIT).

GOING PUBLIC
NovAtel announces an initial public offering (IPO).

Magellan Systems Corp. plans to merge with Ashtech Inc.

JAVAD
Javad Ashjaee, founder and former CEO of Ashtech, founds JAVAD Positioning Systems (JPS) and introduces Legacy, Odyssey and Regency products, followed by HiPer, a 76-channel geodetic receiver.

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PHOTO CREDITS: (Top left to bottom right) FAA, U.S. Air Force, White House, GM, Smithsonian, CAST Navigation, JuSun/iStock/Getty Images Plus/Getty Images, *GPS World*.

System Successes

2001 January

"[A] funny thing happened to GPS on the way to the millennium. The technology began disappearing into its applications. As it became more commonplace, GPS also became more ephemeral. As GPS became more widely recognized in advertising, popular media, and consumer products — three letters that everyone could spell — GPS's presence became more invisible within the systems that use it."
— Glen Gibbons, *GPS World* founding editor

DGPS SERVICE
The U.S. Coast Guard declares full operational capability (FOC) of its DGPS service and its expansion into a national DGPS.

Vice President Al Gore announces a proposal to finance GPS modernization, including the addition of two new civil signals.

SA TURNED OFF
President Bill Clinton orders selective availability (SA) turned off on May 1.

The U.S. Department of Defense (DOD) wins funds for GPS modernization.

VULNERABLE
The DOT releases a report assessing the vulnerability of the transportation infrastructure relying on GPS.

911 CALLS
The Federal Communications Commission (FCC) mandates hybrid GPS/cellular positioning either in cellphone handsets or towers to enable emergency services to locate 911 callers.

WAAS
The FAA commissions the Wide Area Augmentation System (WAAS) for instrument flight use supporting minimums as low as 250 feet.

50 BIRDS ALOFT
The 50th GPS satellite is launched.

The U.S. Air Force awards contracts to Lockheed Martin and the Boeing Company for Phase A development for the GPS III program.

ENTER L2C
The Inmarsat-4 F1 satellite, over the Indian Ocean, broadcasts the first SBAS-like signal at the third civil GPS frequency (L5).

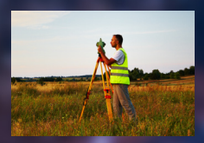
The first IIR-M GPS satellite is launched, broadcasting the new L2C signal.

ACCURACY UP
Accuracy improves by 10–15% for GPS users worldwide after the Joint Program Office (JPO), with help from other agencies and industry, upgrades software processing and modeling.

GPS III RFP
The GPS Wing releases an RFP for development and production of the Block IIIA satellites, the first of three GPS III increments.

1999 2000 2001 2002 2003 2004 2005 2006 2007

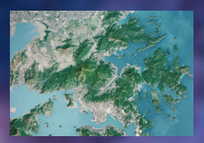
Industry Advances



IN THE FIELD
Magellan and Topcon agree to form a jointly owned company to develop and sell precise positioning products for the surveying, industrial, GIS, mapping, and machine-control markets.

AGRICULTURE
Now a wholly owned subsidiary of Deere & Company, NavCom Technology and its StarFire positioning are deemed important to the agricultural industry.

Topcon Corp. buys Javad Positioning Systems (JPS).



EXPANSIONS
Leica buys ERDAS and the remaining shares of LH Systems from BAE Systems for a foothold in the GIS and remote-sensing sectors.

Thales buys Magellan Corp. and Navigation Solutions to bolster its position in the U.S. equipment and services market.

SMART STATION
In a new partnership, NovAtel begins customizing GPS components for Leica Geosystems' surveying devices. The first product developed was Leica's System 1200, launched in February 2004, which uses a NovAtel precise positioning engine and geodetic quality antenna.

MERGING
Trimble acquires Applanix, focusing on survey and construction products that augment GPS with INS.

Lockheed Martin and Spectrum Astro announce plans to combine their efforts to win future contracts for the GPS III modernization.

PROFITS UP
SiRF Technology files for an IPO.

Trimble, Garmin, CSI Wireless, and NovAtel all have record profits in the second fiscal quarter of the year.

OLD IS NEW
GPS and satellite radio receivers are eBay's top-selling categories; both show triple-digit gains.

SiRF Technology acquires Motorola's GPS chipset product lines.

Qualcomm reaches 100 million gpsOne-enabled handsets worldwide.

RETAIL EXPERIENCE
Garmin opens a retail store on Chicago's Magnificent Mile.

M&A FEVER
CSI Wireless changes its name to Hemisphere GPS.

Broadcom buys GPS chip-maker Global Locate.

Topcon acquires Javad Navigation Systems.

Nokia purchases Navteq.

Hexagon acquires NovAtel.

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System Successes

2010 January

"I started *GPS World* back in 1989. With a $1,200 investment and business plan in hand, I struggled through 43 investor presentations until finally receiving an approval nod for funds to launch the magazine. What I remember most during those times was invariably a potential investor would say, 'Now explain this to me again — what is GPS and why does it need a magazine?'"
— Stephen Colwell, *GPS World* publisher

GPS III AWARD
The U.S. Air Force awards a $1.4 billion development and production contract for the first eight GPS III satellites (Block IIIA) to a team headed by Lockheed Martin. Team members include ITT Corp. and General Dynamics.

BLOCK IIR-M
The final Block IIR-M satellite is launched and begins to broadcast a demonstration of the L5 signal.

BLOCK IIF LAUNCHED
GPS satellite IIF-1, first of a new generation, is launched with a full L5 transmitter.

LIGHTSQUARED
U.S. government tests show that 75% of GPS receivers examined were interfered with at a distance of 100 meters from a LightSquared base station.

LOCATA DEMO
The U.S. Air Force signs a contract with Locata to install a ground-based LocataNet positioning system at White Sands Missile Range, New Mexico, fielding Locata's technology for reference-truth positioning when GPS is being completely jammed.

SPACEX ARRIVES
The U.S. Air Force signs a cooperative research and development agreement with SpaceX. The FAA releases a new roadmap for the integration of civil unmanned aerial systems (UAS) in the National Airspace System.

CIVIL SIGNALS
The U.S. Air Force Space Command begins broadcasting civil navigation (CNAV) messages on all operational GPS satellites capable of transmitting the L2C and L5 signals. L2C is designed to meet commercial needs; L5 meets safety-of-life transportation requirements.

DRONES TAKE OFF
The FAA issues regulations authorizing six unmanned aerial systems (UAS) test sites, one in each of six states, to operate without requiring authorization for each type of aircraft flown.

OCX RECEIVERS
Harris Corp. delivers the first of 34 modernized receivers to support the GPS Next-Generation Operational Control System (OCX). They receive 13 military and civilian signals.

On Dec. 15, Galileo Initial Operational Capability (IOC) is declared.

2008 2009 2010 2011 2012 2013 2014 2015 2016

Industry Advances

GPS + GLONASS
GNSS capabilities of the International GNSS Service (IGS) tracking network are greatly enhanced, giving rise to a truly global GNSS tracking system with more than 100 GNSS (GPS + GLONASS) receivers.

SiRF > CSR > QUALCOMM
SiRF merges with CSR, which is acquired by Qualcomm in 2015. Trimble introduces its AP Series of embedded GNSS/inertial OEM boards plus an inertial measurment unit from Applanix.

EADS Astrium acquires Surrey Satellite Technology Ltd., maker of Galileo's initial satellite, GIOVE-A.

BY ANY OTHER NAME
Magellan changes its name to Ashtech. Septentrio releases the multi-GNSS receiver AsteRx 3.

COALITION FORMS
The Coalition to Save Our GPS is formed by industry represenatives in response to the FCC's conditional waiver for LightSquared.

Trimble acquires Ashtech and launches the Trimble CenterPoint RTX correction service.

JAVAD GNSS announces a partnership with LightSquared.

MANY DAGRS
Rockwell Collins delivers its 450,000th Defense Advanced GPS Receiver (DAGR) to U.S. and allied warfighters.

INDUSTRY ALLIES
The GPS Innovation Alliance is launched, replacing both the U.S. GPS Industry Council and the Coalition to Save Our GPS.

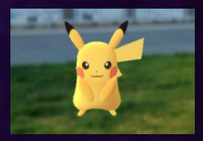
Locata's LocataLite system creates ground-based, centimeter-level, autonomous local replicas of GPS.

IMAGES FROM SPACE
Google acquires Skybox Imaging for $500 million. Skybox — renamed Terra Bella in 2016 — develops small, high-resolution imaging satellites. In 2017, Planet acquires Terra Bella.

Google reveals a self-driving auto prototype without a steering wheel.

Wearables are big at CES.

CORRECTIONS
Hemisphere GNSS releases its Atlas GNSS global correction service, along with its AtlasLink smart antenna.



POKEMON GO
Pokémon GO fever sweeps the land. The augmented-reality Android game uses GPS to bring the imaginary Pokémon creatures into the real world.

PHOTO CREDITS: (Top left to bottom right) U.S. Air Force, NPEF, IGS, SiRF, Septentrio, Trimble.

PHOTO CREDITS: (Top left to bottom right) Locata, SpaceX, FangXiaNuo/iStock Unreleased/Getty Images, smckenzie/iStock/Getty Images Plus/Getty Images, Raytheon, Rockwell, GPSIA, Terra Bella, Hemisphere GNSS, Niantic.

System Successes

NEXT-GEN OCX
The U.S. Air Force accepts delivery of the OCX Launch and Checkout System (LCS) (Block 0) baseline from Raytheon. LCS is a fully modernized cyber-secure ground system.

VESPUCCI ALOFT
The first GPS III satellite ("Vespucci") is launched aboard a SpaceX rocket. The U.S. Air Force awards Lockheed Martin a $7.2 billion contract to build 22 more GPS III satellites.

The U.S. Navy awards Raytheon a contract for a next-generation precision landing system (JPALS).

Australia invests in an SBAS.

GPS III PRODUCTION
Lockheed Martin's GPS III production facilty keeps new satellites rolling off the production line. GPS III SV02 and SV03 are launched.

LIGADO DECISION
The FCC approved an order to allow Ligado Networks to deploy a low-power nationwide 5G network, despite objections from the DOD, DOT and major U.S. airlines concerned about GPS interference.

China completes BeiDou-3 launches.

2017 2018 2019 2020

Industry Advances

ENTER LIGADO
LightSquared re-emerges as Ligado Networks.

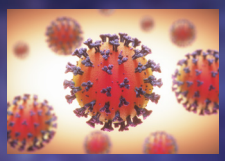
Garmin agrees to acquire DeLorme.

Google announces it will provide raw GNSS measurements via Android phones.

Iridium introduces its Satellite Time and Location (STL) service.

DUAL FREQUENCY
Mobile brand Xiaomi launches the first dual-frequency GNSS smartphone, which is outfitted with a Broadcom BCM47755 chip.

STORY MAPS
Esri introduces a new Story Maps beta. The Story Maps team was founded in 2010 to enable place-based multimedia storytelling.



COVID-19 HITS
A pandemic of the coronavirus COVID-19 disrupts the industry. Many employees begin to work from home, while those at facilities wear personal protective equipment. New GNSS products continue to be introduced.

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