**GPS Block IIF**, or **GPS IIF** is an interim class of [GPS (satellite)](https://en.wikipedia.org/wiki/GPS_(satellite)) which were used to bridge the gap between previous Navstar [Global Positioning System](https://en.wikipedia.org/wiki/Global_Positioning_System) generations until the [GPS Block III](https://en.wikipedia.org/wiki/GPS_Block_III) satellites became operational. They were built by [Boeing](https://en.wikipedia.org/wiki/Boeing), operated by the [United States Air Force](https://en.wikipedia.org/wiki/United_States_Space_Force), and launched by the [United Launch Alliance](https://en.wikipedia.org/wiki/United_Launch_Alliance) (ULA) using [Evolved Expendable Launch Vehicles](https://en.wikipedia.org/wiki/Evolved_Expendable_Launch_Vehicle) (EELV).[[2]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-Boeing-2) They are the final component of the Block II GPS constellation to be launched. On 5 February 2016, the final Block IIF satellite was successfully launched, completing the series.

The spacecraft have a mass of 1,633 kg (3,600 lb) and a design life of 12 years. Like earlier GPS satellites, Block IIF spacecraft operate in [semi-synchronous](https://en.wikipedia.org/wiki/Semi-synchronous_orbit) [medium Earth orbits](https://en.wikipedia.org/wiki/Medium_Earth_orbit), with an altitude of approximately 20,460 km (12,710 mi), and an [orbital period](https://en.wikipedia.org/wiki/Orbital_period) of twelve hours.

The satellites supplement and partially replace the [GPS Block IIA](https://en.wikipedia.org/wiki/GPS_(satellite)#Block_IIA_series) satellites that were launched between 1990 and 1997 with a design life of 7.5 years.[[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3) The final satellite of the Block IIA series was decommissioned on 09 October 2019.[[4]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-IIA-status-4) The [operational constellation](https://en.wikipedia.org/wiki/List_of_GPS_satellites) now includes Block IIR, IIRM, IIF and III variants.

Because the Evolved Expendable Launch Vehicles are more powerful than the [Delta II](https://en.wikipedia.org/wiki/Delta_II), which was used to orbit earlier Block II GPS satellites, they can place the satellites directly into their operational orbits. As a result, Block IIF satellites do not carry [apogee kick motors](https://en.wikipedia.org/wiki/Apogee_kick_motor). The original contract for Block IIF, signed in 1996, called for 33 spacecraft. This was later reduced to 12, and program delays and technical problems pushed the first launch from 2006 to 2010.[[5]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-GSORG-5)

**New characteristics**

* Broadcasting L5 "[safety of life](https://en.wikipedia.org/wiki/GPS_signals#L5,_Safety_of_Life)" navigation signal demonstrated on [USA-203](https://en.wikipedia.org/wiki/USA-203)[[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3)
* Broadcasting a new [M-code](https://en.wikipedia.org/wiki/GPS_signals) signal [[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3)
* Doubling in the predicted accuracy [[6]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-SV1MOB-6)
* Better resistance to [jamming](https://en.wikipedia.org/wiki/Radio_jamming)[[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3)
* Reprogrammable processors that can receive software uploads [[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3)
* The first GPS satellites not to have [Selective Availability](https://en.wikipedia.org/wiki/Error_analysis_for_the_Global_Positioning_System#Selective_Availability) (SA) hardware installed, which degraded civilian accuracy when turned on in the original satellite fleet [[3]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-dailytech1-3)

**Launch history**

Overall, 12 GPS Block IIF satellites were launched, all of which are currently operational:

| **Satellite** | **USA designation** | **Launch date**  **(**[**UTC**](https://en.wikipedia.org/wiki/Coordinated_Universal_Time)**)** | **Rocket** | **Launch site** | **Status** | **Notes** | **Ref.** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| [GPS IIF-1](https://en.wikipedia.org/wiki/USA-213) ([Polaris](https://en.wikipedia.org/wiki/Polaris)) | USA-213 | 28 May 2010, 03:00 | [Delta IV-M+(4,2)](https://en.wikipedia.org/wiki/Delta_IV), s/n D349 | [Cape Canaveral](https://en.wikipedia.org/wiki/Cape_Canaveral_Space_Force_Station), [SLC-37B](https://en.wikipedia.org/wiki/Cape_Canaveral_Space_Launch_Complex_37) | In service |  | [[6]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-SV1MOB-6)[[7]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-7)[[8]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-ULASV1-8) |
| [GPS IIF-2](https://en.wikipedia.org/wiki/USA-232) ([Sirius](https://en.wikipedia.org/wiki/Sirius)) | USA-232 | 16 July 2011, 06:41 | Delta IV-M+(4,2), s/n D355 | Cape Canaveral, SLC-37B | Retired  10 August 2023[[9]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-9)[[10]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-10) |  | [[11]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-GPS_IIF-2-11) |
| [GPS IIF-3](https://en.wikipedia.org/wiki/USA-239) ([Arcturus](https://en.wikipedia.org/wiki/Arcturus)) | USA-239 | 4 October 2012, 12:10 | Delta IV-M+(4,2), s/n D361 | Cape Canaveral, SLC-37B | In service | This launch came shortly before the 10th anniversary of the inaugural Delta IV launch. | [[12]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-GPS_IIF-3-12) |
| [GPS IIF-4](https://en.wikipedia.org/wiki/USA-242) ([Vega](https://en.wikipedia.org/wiki/Vega)) | USA-242 | 15 May 2013, 21:38 | [Atlas V](https://en.wikipedia.org/wiki/Atlas_V) 401, s/n AV-039 | [Cape Canaveral](https://en.wikipedia.org/wiki/Cape_Canaveral_Space_Force_Station), [SLC-41](https://en.wikipedia.org/wiki/Cape_Canaveral_Space_Launch_Complex_41) | In service |  | [[13]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-13)[[14]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-14) |
| [GPS IIF-5](https://en.wikipedia.org/wiki/USA-248) ([Canopus](https://en.wikipedia.org/wiki/Canopus)) | USA-248 | 21 February 2014, 01:59 | Delta IV-M+(4,2), s/n D365 | Cape Canaveral, SLC-37B | In service |  | [[15]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-15) |
| [GPS IIF-6](https://en.wikipedia.org/wiki/USA-251) ([Rigel](https://en.wikipedia.org/wiki/Rigel)) | USA-251 | 17 May 2014, 00:03 | Delta IV-M+(4,2), s/n D366 | Cape Canaveral, SLC-37B | In service |  | [[16]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-16) |
| [GPS IIF-7](https://en.wikipedia.org/wiki/USA-256) ([Capella](https://en.wikipedia.org/wiki/Capella)) | USA-256 | 2 August 2014, 03:23 | Atlas V 401, s/n AV-048 | Cape Canaveral, SLC-41 | In service |  | [[17]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-boeingsched-17)[[18]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-18) |
| [GPS IIF-8](https://en.wikipedia.org/wiki/USA-258) ([Spica](https://en.wikipedia.org/wiki/Spica)) | USA-258 | 29 October 2014, 17:21 | Atlas V 401, s/n AV-050 | Cape Canaveral, SLC-41 | In service |  | [[19]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-GPS_IIF-8FT-19)[[20]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-20) |
| [GPS IIF-9](https://en.wikipedia.org/wiki/USA-260) ([Deneb](https://en.wikipedia.org/wiki/Deneb)) | USA-260 | 25 March 2015, 18:36 | Delta IV-M+(4,2), s/n D371 | Cape Canaveral, SLC-37B | In service |  | [[21]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-21) |
| [GPS IIF-10](https://en.wikipedia.org/wiki/USA-262) ([Antares](https://en.wikipedia.org/wiki/Antares)) | USA-262 | 15 July 2015, 15:36 | Atlas V 401, s/n AV-055 | Cape Canaveral, SLC-41 | In service |  | [[17]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-boeingsched-17) |
| [GPS IIF-11](https://en.wikipedia.org/wiki/USA-265) ([Altair](https://en.wikipedia.org/wiki/Altair)) | USA-265 | 31 October 2015, 16:13 | Atlas V 401, s/n AV-060 | Cape Canaveral, SLC-41 | In service |  | [[17]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-boeingsched-17)[[22]](https://en.wikipedia.org/wiki/GPS_Block_IIF#cite_note-22) |
| [GPS IIF-12](https://en.wikipedia.org/wiki/USA-266) ([Betelgeuse](https://en.wikipedia.org/wiki/Betelgeuse)) | USA-266 | 5 February 2016, 13:38 | Atlas V 401, s/n AV-057 | Cape Canaveral, SLC-41 | In service |  |  |