

# Two more satellites join Galileo working constellation

June 8 2017

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Galileo satellites are placed in medium orbits, at 23 222 km altitude along three orbital planes so that a minimum of four satellites will be visible to user receivers at any point on Earth once the constellation is complete. The fifth and sixth Galileo satellites, launched together on 22 August 2014, ended up in an elongated orbit travelling out to 25 900 km above Earth and back down to 13 713 km. In addition, the orbits are angled relative to the equator less than

originally planned. Credit: ESA-P. Carril

Two further satellites have formally become part of Europe's Galileo satnav system, broadcasting timing and navigation signals worldwide while also picking up distress calls across the planet.

These are the 15th and 16th satellites to join the network, two of the four Galileos that were launched together by Ariane 5 on 17 November, and the first additions to the working constellation since the start of Galileo Initial Services on 15 December.

The growing number of Galileo users around the world will draw immediate benefit from the enhanced service availability and accuracy brought by these extra satellites.

The launch into space and the manoeuvres to reach their final orbits still left a lot of rigorous testing before the satellites could join the operational constellation.

Their [navigation](#) and search and rescue payloads had to be switched on, checked and the performance of the different Galileo signals assessed methodically in relation to the rest of the worldwide system.

This lengthy testing saw the satellites being run from the second Galileo Control Centre in Oberpfaffenhofen, Germany, while their signals were assessed from ESA's Redu centre in Belgium, with its specialised antennas.

The tests measured the accuracy and stability of the satellites' atomic clocks – essential for the timing precision to within a billionth of a second as the basis of [satellite](#) navigation – as well as assessing the

quality of the navigation signals.



Liftoff of Ariane flight VA233, carrying four Galileo satellites, from Europe's Spaceport in Kourou, French Guiana, on 17 November 2016. Credit: ESA–Stephane Corvaja, 2016

Oberpfaffenhofen and Redu were linked for the entire campaign, allowing the team to compare Galileo signals with satellite telemetry in near-real time.

Making the tests even more complicated, the satellites were visible for only three to nine hours a day from each site.

The satellites are now broadcasting working navigation signals and are ready to relay any Cospas–Sarsat distress calls to regional emergency services.

Now that these two satellites are part of the constellation, the remaining pair from the Ariane 5 launch is similarly being checked to prepare them for service.

Provided by European Space Agency

Citation: Two more satellites join Galileo working constellation (2017, June 8) retrieved 19 April 2024 from <https://phys.org/news/2017-06-satellites-galileo-constellation.html>

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