

# Science Focus

Past, with flying colours

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**ALIEN ATMOSPHERES ON EARTH**

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## Primer

# SpaceX Starlink

**SPACE X'S AMBITIOUS PROJECT TO PROVIDE BROADBAND CONNECTIONS TO HARD-TO-REACH AREAS OF THE PLANET HAS GOT SOME COMMENTATORS WORRIED ABOUT LIGHT POLLUTION, SPACE JUNK AND THE FUTURE OF ASTRONOMY**

## WHAT IS IT?

SpaceX's Starlink aims to bring ultrafast broadband internet to the entire planet via a vast constellation of low orbit satellites. The basic idea is that the network will send messages via a series of ground-based terminals. SpaceX's CEO Elon Musk describes the terminals as being 'as big as a pizza box' and can theoretically be installed anywhere, transmitting signals to the satellites using radio waves. The satellites will then beam the message around the planet using lasers until it reaches the desired destination, it will then be beamed back down to Earth via radio waves again.

## WHY ARE THEY DOING THAT?

Aside from the purely altruistic goal of providing the entire planet with a reliable, affordable internet connection, Musk has previously stated that the considerable revenue he hopes to generate from the project – somewhere in the region of \$3bn a year – could be used to fund SpaceX's even more ambitious goals of establishing human colonies in space. "We think this is a key stepping stone on the way towards establishing a self-sustaining city on Mars and a base on the Moon," he said.

## WHAT HAS HAPPENED SO FAR?

On 23 May, at 2:30pm Coordinated Universal Time (UTC), SpaceX kicked off the first phase of the project by



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successfully placing 60 Starlink satellites into low Earth orbit. They were launched from NASA's Kennedy Space Centre in Cape Canaveral, Florida, on board one of SpaceX's reusable Falcon 9 rockets and deployed about one hour later. Each of the satellites weighs around 225kg making them the heaviest payload carried by a

SpaceX rocket to date. Musk confirmed via Twitter that all 60 satellites were online shortly afterwards. They were initially deployed at an altitude of 440km with their thrusters eventually carrying them to their final altitude of 550km. That's higher than the International Space Station, which sits at 408km, but much lower than satellites in geostationary orbit, which sit at 35,786km.

## WHAT HAPPENS NEXT?

The company will now begin a series of tests on the satellites' hardware, including their solar arrays and ion thrusters. In the next year Musk says that he would like to see 720 satellites in orbit and even has plans to start offering an internet service within this time frame. The long-term plan is to have several launches a year until there are nearly 12,000 in orbit in the late-2020s.

## WHY THE CONTROVERSY?

The first potential issue that has been raised is that there are already something like 5,000 satellites in low Earth orbit, significantly adding to this number could increase the risk of collisions and the possibility of debris falling to Earth. SpaceX says that as the satellites are designed to disintegrate when they re-enter the Earth's atmosphere this shouldn't be a problem.

## WILL WE BE ABLE TO SEE THEM FROM EARTH?

It is too soon to say for sure but most estimates seem to suggest that they will only be visible to the naked eye from very dark sites. However, some astronomers have voiced concerns that the satellites will be visible to optical telescopes and that the radio signals from Starlink could potentially interfere with signals being picked up by radio telescopes.

by **JASON GOODYER**

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