



Germany's first moon landing: Vodafone puts its LTE network into outer space

- "I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the Earth."
John F. Kennedy, Mission to the Moon 1961
- "Let's commit to putting the first German spacecraft on the moon. And the first LTE network into outer space."
Robert Böhme and Hannes Ametsreiter, Mission to the Moon 2018

Hanover, 19 March 2017 – Cape Canaveral, summer 2018. 3-2-1 lift-off. The Falcon rocket launcher takes off and accelerates to a speed of 9.8 kilometres per second. Once in orbit, the first stage booster detaches and Falcon sets off on the 380,000 kilometre journey to the Moon carrying landing module ALINA. The spacecraft enters the Moon's orbit at a precisely calculated angle and executes a perfect landing on the Moon's surface. After touching down close to the Apollo 17 landing site, the last manned lunar mission, it will establish a wireless connection to the Earth and make history as the first lunar LTE base station. Two connected Audi lunar quattro rovers will roll out of ALINA's belly. They'll be controlled by the Mission Control Centre's team in Berlin via the Moon's first cellular V2X network. Then, they'll set off on an expedition to the Apollo 17 landing site, the place where the astronauts on that final manned mission walked on the Moon's surface. The rovers will send high resolution images back to the Earth – the first images captured on the Moon for over 45 years. ALINA, the rovers and the base station will stay on the moon and the wireless network will continue to work for as long as the sun's rays power its solar panels, providing the communication infrastructure for all future Moon missions. When they touch down, the wireless network will already be in place.

Mission to the Moon 2018: Vodafone and the Part Time Scientists, a Berlin-based startup, hope to write the next chapter in mankind's biggest adventure by organising a new mission to the Moon to explore the lunar landscape. Vodafone's wireless experts and the space experts at Part Time Scientists are collaborating to make Germany's first Moon landing possible by setting up the first LTE network in outer space. It will provide the communication infrastructure for all future missions and perhaps even make the first lunar outpost possible.

A project made possible by German courage, pioneering spirit and inventiveness

"We're embarking on a space adventure with the Part Time Scientists in a joint project to make Germany's first Moon landing possible. And to set up the first LTE network in space," said Vodafone Germany's CEO Hannes Ametsreiter. "Our LTE base station will be a cornerstone in many future Moon missions. Our network will already be in place when Elon Musk's astronauts orbit the Moon in 2018, and when the ESA sets up its first lunar outpost. We got involved in this project because it's making an important contribution to infrastructure, and also because it's a great example of a German team achieving something of immense significance through sheer courage, pioneering spirit and inventiveness."

The Part Time Scientists startup was founded by 31 year-old Berlin IT expert Robert Böhme. He's been working on achieving his dream for 8 years now, and it's attracted the scientific interest of famous universities and space agencies such as NASA, ESA and DLR, all of them now technology partners helping him to pull off this bold mission. The Part Time Scientists really did start out as Part Time scientists, working on their space technology in their spare time. ALINA, their Autonomous Landing and Navigation Module, was developed and tested by them at their Berlin laboratories in a

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several-year-long project. This rigorous testing was essential because ALINA will have to withstand vacuum, extreme temperatures and massive fluctuations in radiation levels. It is currently the lightest spaceship in the world designed for a soft landing on the Moon. Both Audi lunar quattro rovers were developed in collaboration between the Part Time Scientists team and the German car manufacturer, and they were also subjected to extreme tests. Like ALINA, the rovers will be fitted with cellular V2X antennas for their Moon mission so that they can communicate with ALINA and with each other – whatever the distance between them.

Cellular V2X is a potential space technology facilitating efficient lunar exploration

Robert Böhme, CEO of Part Time Scientists: "We've found an excellent technology partner for our Moon mission in Vodafone. Its LTE certainly has the potential to be a space technology because a Moon mission isn't just about navigating the rocket there and landing safely, it's also about having an energy efficient network for the lunar equipment and operations enabling efficient lunar exploration and research. We have that thanks to cellular V2X."

Energy is one of the most important resources of all in space because all power is generated with solar panels. In previous missions, most of the available energy was expended on video communications and communications with mission control. It meant stopping work for lengthy periods of time to recharge the rovers and spacecraft. Cellular V2X solves the energy problem in Mission to the Moon 2018 because it's a technology that only consumes a fraction of the total energy resources – leaving the Part Time Scientists and their research partners with far more energy for lunar research and exploration. LTE doesn't just transmit data more efficiently, it also enables the more effective control of the spacecraft and the rovers. Vodafone's new LTE technology was recently introduced on Earth and the first Audi prototypes are already using it for vehicle-to-vehicle communication so they can warn each other about hazards.

Lunar gas: helium 3 could supply mankind with energy for thousands of years

Researchers around the world are excited about the Moon mission because the Moon has vast natural resources that would benefit mankind. Ice at the Moon's poles could be used as fuel for missions travelling onwards into space, and the Moon could be an outpost site for telescopes or a bridge to Mars. The many tons of helium 3 on the Moon could supply the Earth with energy for thousands of years. Just one kilo of helium 3 is enough to meet 80% of Germany's energy requirements for one whole year.

There are no telecoms regulators on the Moon. But it does have cultural heritage status.

The Part Time Scientists' Moon mission plans have been associated with quite a few challenges and unusual situations. After all, travelling to the Moon isn't something you do every day. The researchers had a long wait before they got approval to use wireless frequencies on the Moon, only to discover that the approving authority didn't have a form for Moon frequencies. That's because there's no wireless spectrum on the Moon, and there aren't any digital dividends auctions either. The Part Time Scientists also had to agree on an exact landing site on the Moon's 38 million square metres surface (bigger than Africa) with NASA because NASA didn't want them too close to the Apollo 17 landing site, which is akin to a "lunar cultural heritage site". The Part Time Scientists, Vodafone and Audi have promised to respect that when they explore it and share HD quality pictures of it with everyone back on Earth. Perhaps they'll even take the first selfie on the Moon.

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ALINA and the two Audi lunar quattro rovers will be exclusively exhibited by Vodafone in Pavilion 32 at this year's CeBIT in Hanover from 20 to 24 March 2017. Part Time Scientists CEO Robert Böhme and Vodafone Germany's CEO Hannes Ametsreiter will be available to talk with journalists during and after the press conference at 3 p.m. on 19 March. In addition to Germany's first Moon mission, Vodafone will be demonstrating how it is driving and designing the gigabit society according to the motto of "Welcome to the German GIGANETWORK": from smart, secure cities to smart factories, digital retailing and connected vehicles.

Information about Vodafone

Vodafone Germany is a leading integrated telecommunications company and Germany's largest cable television operator, offering fixed broadband, mobile communications, internet and TV services. As a gigabit company, Vodafone is a key contributor to the development of Germany's 5G infrastructure. The Düsseldorf-based company's continuous investments in faster fixed and mobile networks are taking Germany forward into the gigabit society.

Vodafone Germany offers a comprehensive ICT portfolio for enterprise customers, networking people and machines, facilitating secure corporate networks and storing enterprise data in the German cloud. Around 90% of all DAX-listed companies and 15 of Germany's 16 federal states are already Vodafone customers. Vodafone Germany has 14,000 employees and generates annual revenue of € 11 billion with 43.7 million SIM cards, 6.1 million fixed broadband customers and numerous digital solutions.

Vodafone Germany is the largest operating company of the Vodafone Group, one of the world's largest telecommunications companies with mobile operations in 26 countries and partners with mobile networks in 49 more. It also has fixed broadband operations in 17 countries. Vodafone has around 470 million mobile customers and 14.3 million fixed broadband customers around the world.

Visit the website at www.vodafone-deutschland.de for further information.

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