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The Moon Will Get Its Own Mobile Phone Network in 2019



Call it one giant leap for 4G. The moon is about to get its very own mobile phone network.

Vodafone Germany has teamed with Nokia to build the first 4G network on the moon. The network, which will be built in 2019, will support a private lunar rover mission by the Berlin-based team Part Time Scientists, known as PTScientists.

Under the plan, PTScientists' ALINA lander will use the 4G network to beam the first live HD video feed from the surface of the moon. The signal, which will operate in the 1,800-MHz frequency band, "will be broadcast to a global audience via a deep space link that interconnects with the PTScientists server in the Mission Control Centre in Berlin," according to the statement.

www.space.com



James Webb Telescope is probably going to be delayed again

Unfortunately, the launch of this mission has been delayed several times now, with the launch date now set for some time in 2019. And based on the amount of work NASA needs to do complete the JWST before launch, the Government Accountability Office (GAO) believes that more delays are coming and believes that the project is likely to exceed the cost cap set by Congress in 2011 at \$8 billion.

Part of the problem is that all the remaining schedule reserve – the extra time set aside in the event of delays or unforeseen risks – was recently used to address technical issues. These include the "anomalous readings" detected from the telescope during vibration testing back in December 2016. NASA responded to this by giving the project up to 4 months of schedule reserve by extending the launch window.

However, in 2017, NASA delayed the launch window again by 5 months, from October 2018 to a between March and June 2019. This delay was requested by the project team, who indicated that they needed to address lessons learned from the initial folding and deployment of the observatory's sunshield.

Given the remaining integration and test work that lies ahead, more delays are expected. According to the GAO, it is this phase where problems are most likely to be found and schedules revised. Coupled with the fact that only 1.5 months of schedule reserves remain until the end of the launch window, they anticipate that additional launch delays are likely, which will also require budget increases.

www.universetoday.com



What Goes up Must Come Down

The Tiangong-1 station will mostly burn up as it plunges through Earth's atmosphere. Some fragments could survive the fiery reentry, but experts say the risk to humans on the ground is small. "It's much more common to be hit by lightning," said Dr. William Ailor, principal engineer for the Center for Orbital and Reentry Debris Studies at Aerospace. But figuring out exactly where debris from Tiangong-1 could end up is no small task.

For now, ground stations are able to track Tiangong-1 as it speeds along at 16,000 miles an hour some 180 miles above Earth. But as gravity exerts its inexorable pull and the station's orbit decays, it becomes hard to predict the station's position over the planet.

Researchers won't be able to determine with any reliability the ground track — the path along which debris could fall — until roughly a day or two before the satellite falls, Ailor said. "Once it starts to break apart, each of the pieces will fall along the track, but they can be spread out by several hundred miles," he added.

It's not clear whether China can still control the space station. In a May 2017 update provided to the United Nations, China said Tiangong-1 "ceased functioning" on March 16, 2016 but provided no additional details about the status of the orbiting outpost.

Recently, a top Chinese spaceflight engineer denied that the space station was out of control, Reuters reported. But Ailor challenged that assertion, saying it's more likely that Tiangong-1 will make an uncontrolled reentry.

www.nbcnews.com

NASA Looking at Ways to Commercialize International Space Station

In the not-too-distant future, NASA astronauts might conduct their video interviews from the International Space Station (ISS) while wearing Nike-supplied T-shirts, with a giant Toyota logo visible on the module wall behind them.

NASA is developing a commercial-use policy for the orbiting lab, to open up more opportunities for private companies, agency officials said. "Today, there's a number of activities that are prohibited. They can't do advertising and marketing, and fly trinkets — things that are pure for-profit activities," NASA ISS Deputy Director Robyn Gatens said Wednesday (Feb. 28) during a presentation with the agency's Future In-Space Operations working group. "We would like to broaden that, but we need to explore what policy or legal or programmatic changes we would have to make in order to do that," Gatens added. "So, we're starting to dive into that and develop that policy so that we can allow these commercial entities to use the ISS to begin experimenting with a broader set of market possibilities."

That's not to imply that there's no commercial activity associated with the ISS now. The private companies SpaceX and

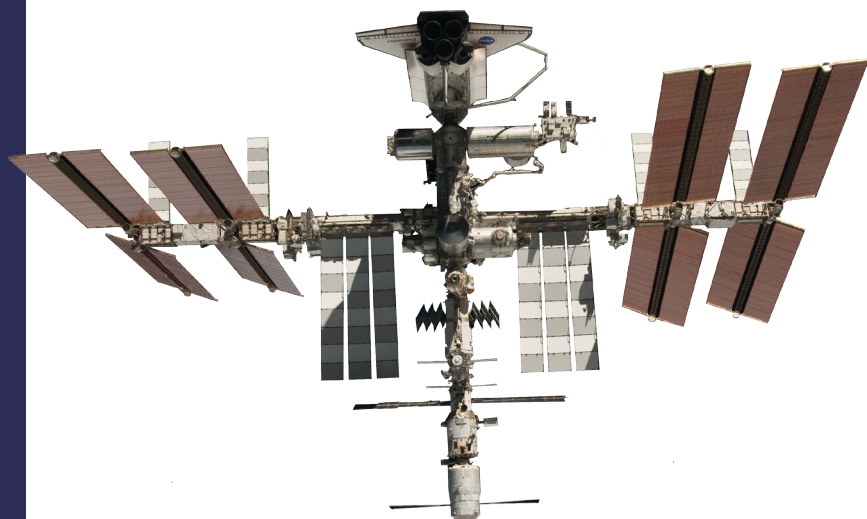
Orbital ATK already launch robotic cargo missions to the orbiting lab. And SpaceX and Boeing hold multibillion-dollar NASA contracts to ferry agency astronauts to and from the station; if all goes well, these taxi flights could begin in the next year or so.

In addition, an inflatable module built by Nevada company Bigelow Aerospace has been attached to the ISS since April 2016. And a great deal of commercial research is conducted aboard the U.S. segment of the station, an officially designated national laboratory that's managed by the nonprofit Center for the Advancement of Science in Space (CASIS).

6 Private Companies That Could Launch Humans Into Space

1. *Space Exploration Technologies (SpaceX)*
2. *Orbital Sciences*
3. *Blue Origin*
4. *Bigelow Aerospace*
5. *SpaceDev/Sierra Nevada Corp.*
6. *Virgin Galactic*

www.space.com



International Space Station with Space Shuttle Endeavour

Signs of Alien Microbes on Enceladus

Microbes that produce methane may already be living on Enceladus, a moon of Saturn which is tipped to host life because it boasts a liquid water ocean beneath a crust of solid ice, and strange atmospheric plumes of water. That's the implication of research showing that an earthbound organism which also produces methane can happily survive in conditions known to exist on Enceladus, from observations by the Cassini space probe before its mission ended last year.

Isolated from deep sea vents almost 1000 metres deep in the Okinawa Trough off Japan, *Methanothermococcus okinawensis* was subjected to gruelling physical and chemical conditions found on Enceladus for more than five years. This microbe, called a methanogenic archaeon, survives without oxygen by combining hydrogen and carbon dioxide – both observed in Enceladus's atmosphere – to make the energy it needs, emitting methane as a waste product. Cassini detected traces of methane in Enceladus's plumes, and there's a chance that some of it may have come from this kind of microbe.

"The conditions we mimicked in the lab are as close as possible to those inferred from Cassini on Enceladus," says Simon Rittmann at the University of Vienna in Austria, who led the investigations. Rittmann subjected the microbe to various combinations of gases found on Enceladus, and found that it was always able to survive when provided with the moon's levels of hydrogen and carbon dioxide. It was still able to thrive at temperatures and pressures likely found in Enceladus's oceans, ranging respectively from 0 to 90 degrees Celsius, and up to 50 Earth atmospheres.

Life on the Seafloor

Rittmann's team also computed how much hydrogen would be produced by a breakdown of olivine minerals – which are predicted to make up the moon's solid core – under a range of likely geological conditions on Enceladus. They found these minerals could break down chemically to produce enough hydrogen for methanogens to thrive.

The best environment for them is likely to be the seafloor. "There, you have contact with rock and minerals, pressures of around 50 atmospheres and temperatures most likely a bit higher than 0 degrees Celsius," says Rittmann. "This [team] has taken the first step to showing experimentally that methanogens can indeed live in the conditions expected on Enceladus," says Chris McKay at NASA Ames Research Center in Moffett Field, California.

Rittmann says he hopes there will be future missions to Enceladus to explore further for signs of life. He says a probe fitted with a mass spectrometer would be able to detect carbon isotope ratios unique to living organisms, as well as other potential "biomarkers" of methanogens, including lipids and hydrocarbons.

"If we find life on Enceladus, it is not likely to be very Earth-like, unless the origin of these life forms is from a common source outside the solar system, which is highly unlikely," says Hunter Waite at the Southwest Research Institute in Texas. Proof of concept on Earth is interesting, he says, but there is no substitute for finding and studying a methanogenic organism in the unique environment of Enceladus.

www.newscientist.com

ASTRO *Special* "Women in Space", Happy Women's Day!



- First Woman in Space, "Valentina Tereshkova": The first woman in space, Valentina Tereshkova, blazed a trail for the many female spaceflyers who would follow. Tereshkova, a Soviet cosmonaut, was selected from more than 400 applicants to launch on the Vostok 6 mission June 16, 1963.



- First Female Spacewalker, "Svetlana Savitskaya": The first woman to complete a spacewalk, or extravehicular activity (EVA), was Soviet cosmonaut Svetlana Savitskaya, who spacewalked during her second flight to orbit in July 1984.



- First American Woman in Space, "Sally Ride": In June 1983, NASA astronaut Sally Ride became the first U.S. woman in space when she launched on the STS-7 mission of the space shuttle Challenger. She was the third woman in space, after Valentina Tereshkova and



- First U.S. Female Spacewalker, "Kathy Sullivan": Astronaut Kathy Sullivan of NASA became the first American woman to make a spacewalk when she floated outside the space shuttle in October 1984.

www.space.com

Soviet cosmonaut Svetlana Savitskaya, who flew on the Soyuz T-7 mission August 19, 1982.

SCHOOLS IN ACTION

Students are continuously coming up with incredible ideas. Their perseverance deserve admiration. Some of them are really excited and some of the others have an air of confidence. We truly believe some of those projects will become real in the future. Thank you all for the amazing projects you have made.



1- Bahçeşehir Collage, ANTALYA 2- School For Child, POLAND 3- İsmail Kaymak Collage, ÇANAKKALE
4- Final Schools, SAMSUN 5- Yönder Collage, İZMİR 6- Yönder Collage, İSTANBUL

Astronomy Picture of the Day

The Complete Galactic Plane: Up and Down

Is it possible to capture the entire plane of our galaxy in a single image? Yes, but not in one exposure -- and it took some planning to do it in two. The top part of the featured image is the night sky above Lebanon, north of the equator, taken in 2017 June. The image was taken at a time when the central band of the Milky Way Galaxy passed directly overhead. The bottom half was similarly captured six months later in latitude-opposite Chile, south of Earth's equator. Each image therefore captured the night sky in exactly the opposite direction of the other, when fully half the Galactic plane was visible. The southern half was then inverted -- car and all -- and digitally appended to the top half to show the entire central band of our Galaxy, as a circle, in a single image. Many stars and nebulas are visible, with the Large Magellanic Cloud being particularly notable inside the lower half of the complete galactic circle.

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