

## Astronauts leave ISS, begin return journey to Earth on SpaceX craft

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WASHINGTON: Four astronauts left the International Space Station aboard a SpaceX vessel, after more than 160 days in space which will culminate in a splash landing off the Florida coast.

The Crew Dragon capsule undocked from the ISS as scheduled at 8:35 pm (0035 Sunday GMT). With the flight back to Earth expected to take six-and-a-half hours, the crew was scheduled to splash down in the dark of night off Panama City, Florida, in the Gulf of Mexico at 2:57 am.

"Dragon separation visually confirmed," a NASA commentator said after two sets of six

hooks tying the capsule to the ISS retracted. The capsule then fired a series of short bursts with its thrusters to gently ease away from the ISS.

NASA livestream footage showed the Crew Dragon capsule moving off into the dark as it began its journey back to Earth, its rear engines lighting up in small flashes. Seven astronauts remained on the ISS including a new crew of four who arrived on a different SpaceX craft last week.

"Thanks for your hospitality," Michael Hopkins, one of the departing US astronauts, said as the capsule moved away. "We'll see you back on Earth." NASA

and SpaceX have alternative splash down sites ready, aside from Panama City, if need be. "We have been practicing to recover the crews day or night," Steve Stich, NASA's Commercial Crew program manager, said shortly before the capsule's departure.

"The ships have lots of lighting," helped by "good moonlight," he said, adding that weather conditions were excellent, with calm seas.

SpaceX boats are expected to reach the capsule about 10 minutes after splashdown. Astronauts Hopkins, Victor Glover, Shannon Walker and Japan's Soichi Noguchi went to space

last November as the crew on the first fully operational mission to the ISS aboard a vehicle made by Elon Musk's SpaceX, which has become NASA's favored commercial transportation partner.

Prior to that, two American astronauts made a test mission to the ISS in May and stayed for two months. That was the first launch to the ISS from US soil since the end of the Space Shuttle program in 2011.

It was also the first crewed mission run by a private company, as opposed to NASA. Until then US astronauts had caught rides to the ISS aboard Russian spacecraft. —AFP

## The first complete single-cell atlas of human teeth

For decades, scientists have been working on different aspects that involve a combination of genetic and tissue regeneration approaches. The developments in stem cell and tissue engineering offer medical and dental scientists detailed insights into new ideas on how everyday clinical practice can be improved.

Now, scientists at the Institute of Oral Biology at the University of Zurich and ETH Zurich have created the first-ever single cells atlas of the human teeth. They used advanced single-cell sequencing technology to differentiate every single cell that is part of the dental pulp and the periodontium. The study also offers a detailed understanding of the composition of these two tissues. Both tissues, the dental pulp, and the periodontium, are subject to tooth-specific and bacterially linked pathologies such as caries and periodontitis. Both tissues consist of stem cells that possess great regenerative potential. The first complete single-cell atlas of human teeth

In the study, scientists determined significant cellular heterogeneity in the dental pulp and the periodontium. They found intriguing similarities in the molecular signatures of the stem cell populations.



First co-author Pierfrancesco Pagella said, "We think their unique microenvironment possibly brings about their different behavior. Our findings suggest that the microenvironmental specificity is the potential source of the significant functional differences of the stem cells located in the various tooth compartments." The investigation shows the intricacy of dental tissues and addresses a significant contribution to a superior comprehension of human dental tissues' cellular and molecular identity. Last author Themios Mitsiadis explained, "Single-cell approaches could help us understand the interactions of the dental pulp and periodontal cells involved in immune responses upon bacterial insults. Therefore, a single-cell analysis could be helpful for diagnostic purposes to support the early detection of dental diseases. —Agencies

## Fine-tuning the color of light with a new optical device

Light is composite of many photons whose energy specifies a color of the rainbow—red, orange, yellow, green, blue, indigo, violet.

Now, using an optical device, Stanford scientists were able to change and fine-tune the frequencies of each photon in a stream of light to virtually any mixture of colors they want. This experiment established a new photonic architecture that could revolutionize various fields, including digital communications and artificial intelligence to cutting-edge quantum computing. This new optical device puts a degree of control in the engineer's hands not previously possible. The structure of this new device includes a low-loss wire to carry a stream of photons. The photons



then enter a series of rings, where each ring has a modulator that transforms the frequency of the passing photons. This frequency is what we see as color. As scientists noted, there could be multiple rings, and engineers can finely control the modulators to dial in the desired frequency transformation. —Agencies

## PTA helps Sri Lanka with mobile number portability



ISLAMABAD: The Pakistan Telecommunication Authority (PTA) has extended training and technical support to the Telecommunications Regulatory Commission of Sri Lanka for successful implementation of Mobile Number Portability (MNP) in the country.

The Sri Lankan regulator has planned to introduce MNP for mobile phone users in the country and intends to follow processes adopted by the PTA. Pakistan is the first country in South Asia to have introduced this facility for its mobile phone users in 2007. The MNP is a service through which a mobile phone user can change his network without changing the number. The MNP has put pressure on mobile phone operators in Pakistan to improve their service and encouraged the companies to improve the quality of service. At the same time the key technical challenge to the MNP is to ensure smooth transfer calls. —The Business Report

## Fortnite maker girds for epic court clash with Apple

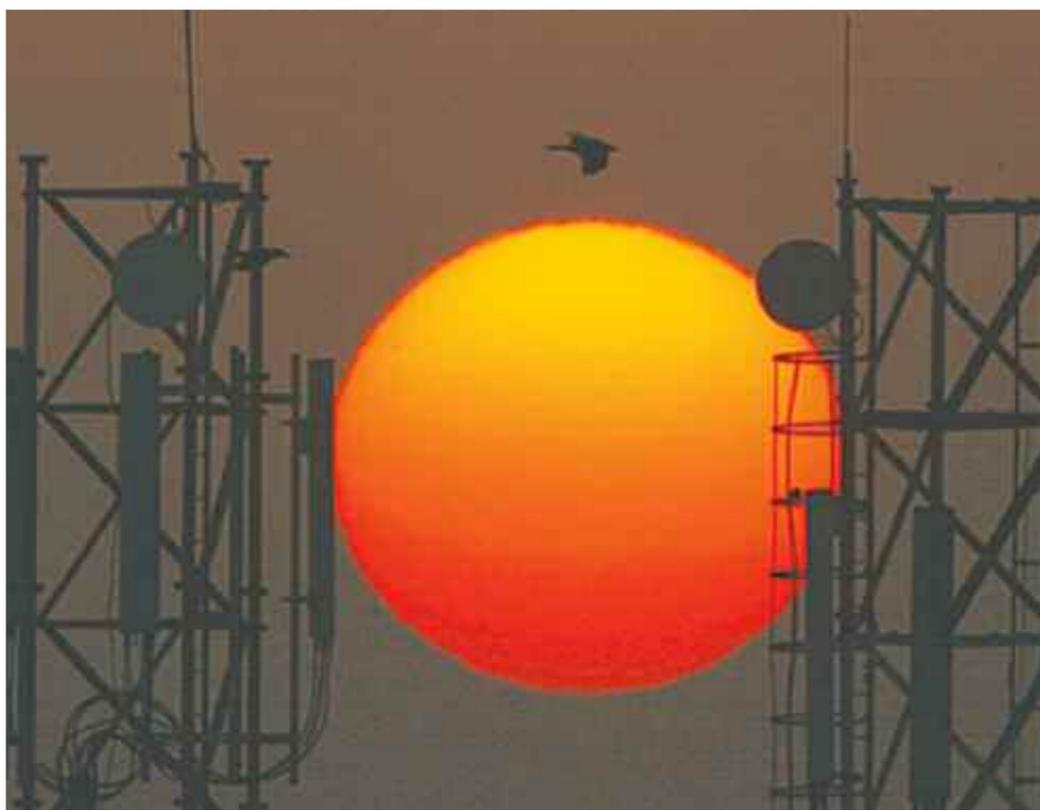
Epic, which is seeking to return to the App Store without being forced to use Apple's payment scheme, is not alone in its criticism

SAN FRANCISCO: In a court clash with potentially huge repercussions for the world of mobile tech, Fortnite maker Epic Games takes on Apple starting Monday aiming to break the grip of the iPhone maker on its online marketplace.

The case opening in federal court comes with Apple feeling pressure from a wide range of app makers over its tight control of the App Store, which critics say represents monopolistic behavior. The two firms will be debating whether Apple has the right to set ground rules, control payment systems and kick out apps from its marketplace that fail to comply. Also at stake will be Apple's slice of revenue from iPhone apps, as much as 30 percent. Apple contends that its commission is the industry norm, and is fair compensation for giving developers a global storefront and keeping it secure. Epic, which is seeking to return to the App Store without being forced to use Apple's payment scheme, is not alone in its criticism. —AFP



## Pakistan to auction mobile telecom spectrum in June



ISLAMABAD: The auction for mobile telephony spectrum is expected to be held in June, and consultants have expressed optimism that it will be successful because of the potential available in Pakistan.

The briefing was made by a consultant at a meeting of the advisory committee for the release of Next Generation Mobile Services (NGMS) spectrum at the Finance Division chaired by Federal Minister for Finance and Revenue Shaukat Tarin.

The committee approved the recommendations for the sale of the spectrum during the meeting, and the consultant would hold meetings with the stakeholders in the next round, and forward the brief related to the auction process. In the next step the consultant will forward the 'information memorandum' containing the details of procedures related to the auction.

The meeting was attended by Federal Minister for Science and Technology Senator Shibli Faraz, Federal Minister for IT and Telecommunication Syed Amin ul Haque, adviser to the PM on Commerce Abdul Razak Dawood, federal secretaries of relevant ministries, chairman of the Pakistan Telecommunication Authority (PTA), Executive Director of the Frequency Allocation Board (FAB) and other officers. The IT minister informed the committee the sale of spectrum was the key to strengthen and expand communication/IT services across the country.

The committee was briefed by the consultant for spectrum auction of 1,800 MHz and 2,100 MHz bands.

The committee was informed that the "Spectrum Auction Pakistan 2020-21" was focused on regulatory consistency for the in-

vestors and increases the mobile broadband proliferation that will also have an impact on the overall economic growth of Pakistan.

The consultant expressed the confidence that there was significant potential for the growth of broadband and telephony across Pakistan and the existing four cellular companies were eager to obtain additional spectrum to harness the growth opportunities. The consultant expressed confidence that the auction would be a success and fetch significant revenues for the government.

The consultant — Frontier Economics — and the PTA signed a contract in January this year for the provision of consultancy services for spectrum auction in Pakistan 2020-21. Frontier Economics Ltd is one of Europe's largest independent economic consultancy firms with experts across a range of industries including telecommunication.

PTA Chairman Amir Azeem Bajwa also briefed the committee about the arrangements underway for the sale of available spectrum. He gave a detailed presentation about the specifications of available spectrum bands and methodology for sale in line with international best practices.

The meeting noted that in-depth analysis would be completed to gauge demand for spectrum and devise a strategy for its pricing and packaging. While taking stock of the situation, the finance minister directed to expedite the sale process for the available spectrum. He stressed to provide a level playing field so that all operators must have a fair and equal chance in the process. Mr Tarin also stressed that all the key stakeholders have to ensure maximum participation across the board for successful completion of the sale transaction. —The Business Report