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# What's News...

### More Available Spectrum on the Way

The government has devised a plan to improve wireless spectrum management to maximize its use. This includes identifying frequencies that can be repurposed for new purposes and improving the management of frequency bands to ensure that both the public and private sectors have access to the spectrum they need to deliver services. The strategy was created by the National Telecommunications Information Administration (NTIA), an agency in the Department of Commerce, in conjunction with the Federal Communications Commission (FCC). It's based on four pillars of "essential actions."

The first is a study of 2.78 GHz of spectrum for possible repurposing within five bands: 3.1 to 3.45 GHz, 5 to 5.09 GHz, 7.125 to 8.4 GHz, 18.1 to 18.6 GHz, and 37to 37.6 GHz to support applications such as wireless broadband, drones, and satellite operations. The second pillar requires long-term planning for spectrum allocation with feedback from industry, federal agencies, and advisory groups, and the third is designed to encourage the use of new techniques such as spectrum sharing to increase efficiency and the last pillar is the development of workforce skills to meet future operational, technical and policy roles in the spectrum ecosystem.

# A Word from Sam Benzacar

#### If Extraterrestial Life is Out There, We're Closer to Finding It

### By Sam Benzacar

Most people would agree that we are not alone in the universe if anyone cared to ask. So, it stands to reason that extraterrestrial beings, whatever and



wherever they may be, must have some way to communicate over long distances. The search for extraterrestrial intelligence has captivated us for centuries. Although the search has yet to yield definitive proof of life beyond Earth, significant advancements in technology and research methods have propelled SETI forward in recent years. A recent initiative called Breakthrough Listen is expanding our reach.

Launched in 2015, Breakthrough Listen, a 10-year, \$100 million project funded by Russian-Israeli billionaire and physicist Yuri Milner, is the most comprehensive and ambitious SETI project ever attempted, utilizing a powerful network of telescopes and advanced data analysis techniques.

Breakthrough Listen has expanded the scope of SETI by searching for both radio and optical signals from exoplanets, galaxies, and beyond. It focuses on various targets, from nearby stars and galaxies to the entire galactic plane. It listens for radio signals not produced by natural cosmic processes while also searching for optical laser emissions, which could be another form of extraterrestrial communication.

The project uses some of the most impressive radio telescopes in the world, including the world's largest steerable radio telescope, the Green Bank Telescope in West Virginia, as well as the Parkes Telescope in Australia, and the Automated Planet Finder, a telescope at Lick Observatory on the summit of Mount Hamilton in the Diablo Range just east of San Jose, Calif.



#### Using RF Energy to Secure Nuclear Weapons

A new technique devised by researchers led by the Max Planck Institute for Security and Privacy aims to remotely monitor the removal of warheads stored in military bunkers by tracking objects' movement in a room using mirrors and RF energy. The presence and number of weapons at a site cannot be verified via satellite imagery or other means because they cannot penetrate the storage vaults. As a result, the 9,000 nuclear weapons are not accounted for under existing nuclear arms control agreements.

The scientists installed 20 adjustable mirrors and two antennas to monitor the movement of a barrel stored in a shipping container. One antenna emits signals that bounce off each mirror to create a unique reflection pattern detected by the other antenna and provide information on the location of objects in the room. If an object is moved, a different reflection pattern will be created. The researchers say the system has proven sensitive enough to detect whether a barrel had shifted by just a few millimeters. The antenna-and-mirror technique doesn't require secure communication channels or tamper-resistant sensor hardware.



The radio telescopes are sensitive enough to detect "Earth-leakage" levels of radio transmission from stars within 5 parsecs (3.26 lightyears). They can detect a transmitter of the same power level as an aircraft radar from the 1,000 nearest stars. Together, the radio telescopes will cover ten times more sky than previous searches and scan the entire spectral region from 1 to 10 GHz range, the so-called "quiet zone" in the spectrum where electromagnetic radiation is unobscured by cosmic sources or Earth's atmosphere. The project is projected to generate as much data in one day as previous SETI projects generated in one year.

Despite the lack of immediate results, SETI has continued to evolve and expand. In recent years, SETI has witnessed several notable advancements, including the development of more sensitive and powerful telescopes. New telescopes like the MeerKAT and the Square Kilometer Array (SKA) can detect fainter signals from greater distances, dramatically expanding the search volume.

Are They Really Out There?

Logic dictates that as the universe is incredibly vast, containing billions of galaxies, each with billions of stars, it seems statistically improbable that Earth is the only planet in the entire universe that supports life. In recent years, astronomers have discovered thousands of exoplanets that orbit stars other than our Sun, many of which are in the habitable zones of their stars, which means they could support liquid water, a key ingredient for life as we know it.

The rapid advances in AI, radio telescopes, receiver performance, and the extensive collaboration of amateurs and scientific researchers worldwide (Breakthrough Listen is open source) make the possibility of finding life beyond Earth tantalizingly close.

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### More Room for Very-Low-Power Devices

FCC commissioners have approved using very-low-power (VLP) unlicensed devices to operate in the 6 GHz band that many criticalcommunications officials consider to be the foundation of mission-critical and business-critical networks' backhaul solutions. Chairwoman Jessica Rosenworcel highlighted the significance of unlicensed devices to the economy, with Wi-Fi as the final wireless connection for many end-user devices. Expanding unlicensed use in the 6 GHz band is a critical component in maintaining this connectivity momentum, according to Rosenworcel.

"We are opening up 850 MHz of the 6 GHz band to small mobile devices operating at very low power while putting in place common-sense safeguards to protect incumbent uses", she continued. "We are also proposing to open up an additional 350 megahertz of the 6 GHz band for very-low-power devices. New immersive, real-time applications can be enabled because we now have the unlicensed bandwidth, with high capacity and low latency."



#### New "Atomic" RF Sensor Revealed

An atomic RF sensor has been developed that offers enhanced sensitivity and versatility and is suited for defense and satellite technology, according to a paper published in Applied Physics Letters by researchers at the University of Otago in New Zealand. They used a small glass bulb containing an atomic vapor to demonstrate a new form of antenna. The bulb uses laser beams, can be placed far from any receiver electronics, and can outperform current antenna technologies in sensitivity, tunability, and size. A key benefit is that they cover vast frequencies so soldiers can use just one instead of multiple antennas. The new design is portable and can be taken outside the laboratory. In a demonstration, the sensor could efficiently measure fields at a distance of 100 ft. using a free-space laser link.





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Dr. Susi Otto of the University of Otago with the portable sensor. Source: University of Otago









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(973) 772-4242