



AT THE CENTER FREQUENCY

An e-Newsletter from Anatech Electronics

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What's News...

Vulnerability Found in VoLTE

Researchers with the Beijing University of Posts and Telecommunications and the University of Birmingham have devised a telecom network attack that can expose call metadata during VoLTE (Voice over LTE) conversations. It includes access to encrypted call metadata such as call times, duration, and direction for mobile network conversations. VoLTE encrypts voice data sent between phone and network using a stream cipher and it has been shown to be vulnerable to something called a "reused key attack". In their paper "Watching your call: Breaking VoLTE Privacy in LTE/5G Networks," the researchers describe how they were able to use the metadata to map phone numbers without detection. They reported that they could map VoLTE metadata from 83.7% to 100% of the time.



FCC Settles the 5G vs. Altimeter Dispute

The FAA has reinforced its ruling that many passenger and cargo aircraft must either get new altimeters or install filters on those already in service to eliminate risks posed by C-band 5G networks and do so before February 2024. In addition, flight manuals must be revised to prohibit low-visibility landings after June of this year unless either one of the actions has been taken. The FAA estimates that 7,993 aircraft will need flight manual revisions, 180 aircraft will require complete altimeter

A Word from Sam Benzacar

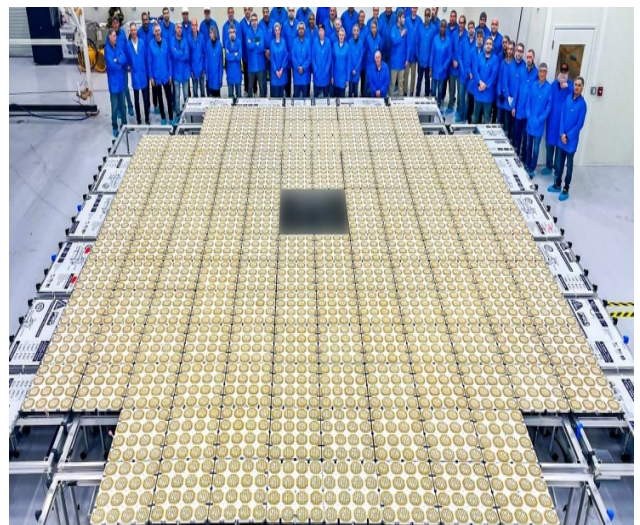
Cellular to Smartphones from Space is Coming

By Sam Benzacar

As I noted in a past column in this newsletter, commercial satellite constellations are increasing every year as the cost of fabrication and launching them into space has become much less expensive. Nearly all the players, such as Starlink, in this market focus on providing wireless communications virtually anywhere on Earth, and they are using huge numbers of small spacecraft to achieve it. The number of these small low-Earth-orbit (LEO) spacecraft should eventually add tens of thousands of satellites to the thousands already up there.



However, the latest entrant in the market, AST SpaceMobile, located in Midland, Texas, has chosen another approach in which "only" 168 satellites will be needed. Its goal is to become the first global 5G broadband service that requires no modification to existing smartphones. In contrast, Starlink requires a relatively small terminal on a home to deliver broadband rather than directly connecting to smartphones.



replacement, and 820 aircraft additional require a better C-band filter. The use of the newly allocated C-band frequencies has resulted in a contentious battle between the airline industry and wireless carriers. The former claimed the proximity of the new frequencies to those used by radar altimeters could cause interference during landing, while the wireless industry denied this was an issue.



Taiwan PAVE PAWS to Get Major Upgrade

Raytheon AN/FPS-115 PAVE PAWS long-range radar system atop Le Shan Mountain in Taiwan will be upgraded to enhance its ability to warn the country of attacks from mainland China and to monitor North Korean ballistic missile tests. The \$412.6 million contract to Raytheon Missiles & Defense includes logistics and engineering services, technical updates, spare parts, and other support under the Taiwan Surveillance Radar Program. PAVE PAWS were first deployed in various places during the 1970s to detect and track incoming missiles, but the installation in Taiwan apparently used outdated technology that will be replaced. It can provide more than 6 minutes of warning time and can detect threats at distances up to 3,100 miles away.

To achieve this feat, AST SpaceMobile's BlueWalker 3 spacecraft requires an active phased array antenna that measures an incredible 693 ft. (see image), which makes it the largest commercial communications array ever deployed in LEO orbit. Like all such antennas, it employs beam steering to optimize coverage but to serve a broad swath of the Earth, the antennas must be enormous. The array on the BlueWalker 3 was successfully deployed to full deployment on November 10, 2022. has a field of view greater than 300,000 square miles and sits at an altitude between (316 and 327 miles. More than 100 satellites are expected to be aloft by 2024, and AST SpaceMobile will begin a test program across six continents with several network operators, assuming it gets the required regulatory approvals.

It already has agreements with mobile network operators such as Rakuten Mobile, AT&T, Bell Canada, Telecom Argentina, Africell, Liberty Latin America, and Orange. However, it's not the only company with similar goals, as SpaceX has inked a deal with T-Mobile to provide the carrier's customers with text services anywhere in the U.S. next year. Voice calls and data will presumably follow. OneWeb and Amazon are also racing to create the technology required to achieve this, although they're years behind SpaceX.

While AST SpaceMobile makes a good case for delivering coverage with just a fraction of the spacecraft of its likely competitors, it's that gigantic phased array that's of concern to radio astronomy, which is already faced with dealing with the existing cloud of spacecraft that can play havoc with the reception of the weak signals it receives.

For example, astronomers at the Vera Rubin Observatory and the International Astronomical Union are raising alarms because the antenna is large enough to reflect so much sunlight that, at times, it can be one of the brightest objects in the night sky. They estimate it will reach brightness magnitude 1, placing it among the 20 brightest stars, outshining more than 99% of the stars visible to the naked eye.

AST SpaceMobile is considering anti reflective materials and changes to operations to make the satellites dimmer, and while some telescopes are designed to avoid bright objects such as the planets or the moon, the next generation of the company's spacecraft, called BlueBirds that are even larger than the BlueWalker 3 will be more difficult to escape. A bright satellite passing through a digital camera's long exposure could fry the camera's sensitive electronics.

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Tesla Wants to Add a Better Radar to Its Vehicles

Tesla has filed an application with the FCC to “re-add” a radar to their vehicles after previously removing the earlier one, claiming that only vision systems were required for semi-autonomous driving. The new version will be an imaging radar that is much more capable than its predecessor that makes a low-resolution image of the radar targets ahead of the vehicle. The company has long taken issues with the proliferation of sensors whose data must be fused, which is a challenging task requiring considerable processing and AI. To make its point, the company even eliminated cheap ultrasonic sensors used when backing up a vehicle.





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