

## **Wi-Fi 6E is the biggest upgrade of an Australian invention over two decades**

*(by Dr. Jolly Wong, FIEAust)*

On 23rd January 1996, the Australia's National Science Agency, also known as the Commonwealth Scientific and Industrial Research Organization (CSIRO), received a patent approval for a method of creating a fast and reliable Wireless Local Area Network (WLAN).

Wi-Fi was an Australian invention — developed by the CSIRO's team of radio engineers: Dr John O'Sullivan, Diet Ostry, Graham Daniels, John Deane and Terry Percival twenty-five years ago. The term Wi-Fi is commonly thought to mean wireless fidelity. It works by broadcasting in the open air that allows our phones, computers and other devices to connect to the internet reliably and at fast speeds.

It used a family of the IEEE 802.11 wireless network protocols for local area networking of devices and Internet access. Today Wi-Fi technology is so widespread there are far, far more Wi-Fi devices than there are human beings. According to Statista, there are over 22.2 billion WLAN connected devices worldwide by 2021. The 2020 Cisco Annual Internet Report predicted Wi-Fi will carry over 50 percent of global internet protocol (IP) traffic by 2022. Perhaps surprisingly then, Wi-Fi standards have been using the same spectrum of the 2.4 GHz and 5 GHz frequency bands for well over two decades without expansion. This is about to change.

In April 2020, the US Federal Communications Commission (FCC) voted to open up spectrum in the 6 GHz band for unlicensed Wi-Fi use. That means there are now 1,200 MHz of additional spectrum in the 6 GHz band available to broadcast open Wi-Fi signals. Wi-Fi 6 Extended, or Wi-Fi 6E, is the industry name that identifies Wi-Fi devices that operate in the new 6 GHz band. In essence, Wi-Fi 6E offers improved user experiences — including higher performance with 59 new channels, lower latency of less than 6 ms, and faster data rates at 2 Gbps — by means of 1,200 MHz more spectrum in the 6 GHz band. The increase of spectrum availability is as if you were driving in on a ten-lane highway as opposed to a two-lane road. There will be more bandwidth and less congestion.

The Wi-Fi Alliance, an industry-wide group that oversees Wi-Fi certification on standards-compliant devices, published a recent report saying that 2021 will see the current annual global economic value of Wi-Fi reach USD 3.3 trillion. The report further suggested that the economic value associated with Wi-Fi use will climb to USD 4.9 trillion by 2025.

According to the IDC research group, 316 million devices will ship with Wi-Fi 6E support in 2021. Smartphones are likely to be the first consumer devices to adopt Wi-Fi 6E as they are the most frequently used consumer, internet-enabled devices.

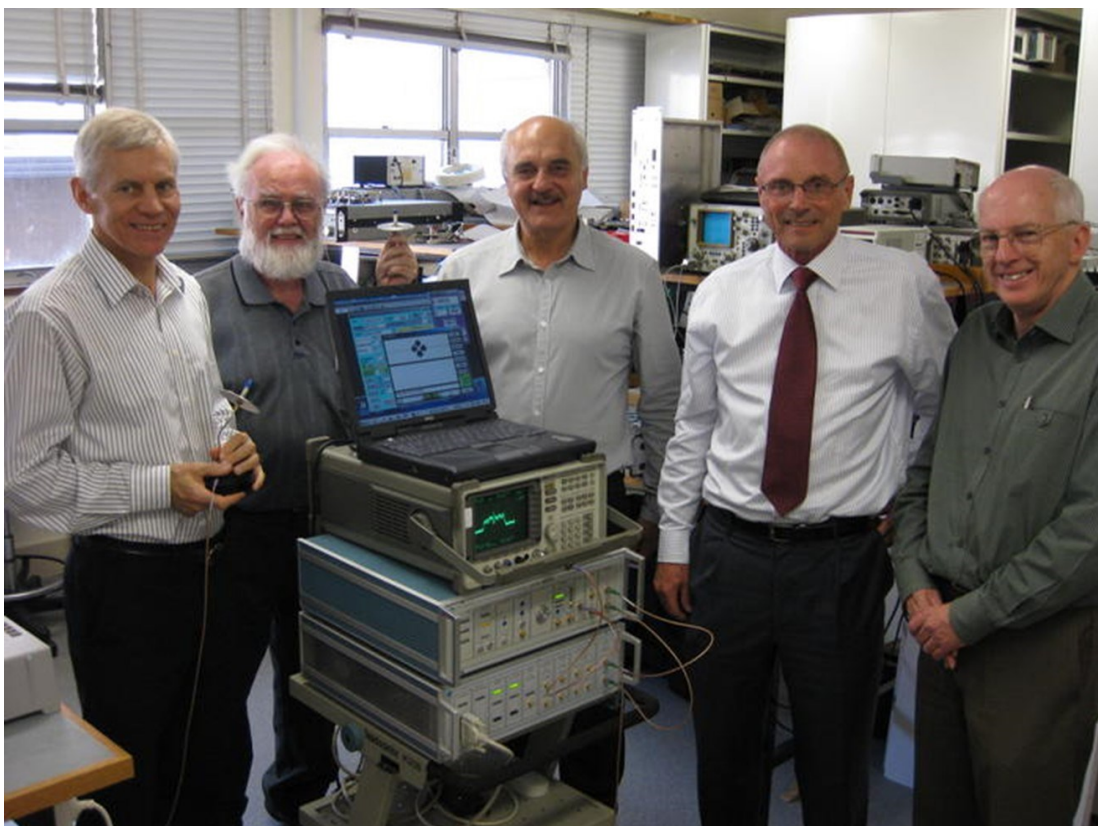
The first phones to support the designation include Samsung Galaxy S21 Ultra, as well as two gaming phones: the Xiaomi M1 and the Asus ROG Phone 5. Each of them uses Qualcomm's Snapdragon 888 chipset which boasts support for Wi-Fi 6E as well as 5G. Apple has not announced when Wi-Fi 6E will be added to iPhone, iPad and Mac. It probably has to wait for another year due to the current chip shortage. But since their competitors are already doing it there is a fair chance that the iPhone 14 will support it.

After smartphones, IDC expects tablets to follow, with adoption in TVs likely in 2022. Right now, when you go to buy a new phone or laptop, you might see the label “Wi-Fi 6” on the box. But “Wi-Fi 6” is not the same as “Wi-Fi 6E”. Wi-Fi 6 devices are still operating on 2.4 and 5 GHz. If you manage an enterprise Wi-Fi network and are due for a refresh soon, I would highly recommend considering Wi-Fi 6E as a key requirement.

But Wi-Fi 6E also faces challenges, and among them are regulatory issues and its limited range. Airwaves are overseen country by country. That means regulators could delay availability of this tech in some countries. Only the US, Canada, South Korea and the UK have adopted the 6E standard. In July 2021, the European Commission, in line with the US FCC, approved the use of 6E. Meanwhile, Both Australia’s (ACMA) and Hong Kong’s (OFCA) regulators are considering the use of the 6GHz band. Many gadgets are shipped globally, too, so regulators could also slow down overall adoption if major markets fall behind.

The primary technological challenge of Wi-Fi 6E is that it has less range than the old version due to its higher frequency of 6 GHz band. The scientific principle that governs this is that the higher the frequency of a wave the shorter the distance it can travel. That means it will fall off at shorter distances, and is more easily blocked by walls. In a typical residential building we really couldn’t expect a 6E signal pass over 15 meters.

Technological development never stops. Even before Wi-Fi 6E is fully implemented the IEEE has already begun to develop “Wi-Fi 7”. They want to develop the next generation high-throughput, time-sensitive wireless protocol which has a less than 5ms delay.



*CSIRO's WLAN patent team, from left, Terry Percival, John Deane, Diet Ostry, John O'Sullivan and Graham Daniels. (Source: csiro)*