



5G mmWave – Unlocking the Full Potential of 5G

5G in the 3.5GHz band allows for higher capacity than previous generations of mobile networks. To achieve even higher capacity, 5G can also use higher frequencies known as millimetre waves (mmWaves) where much more spectrum is available. mmWaves are not new and have been used for decades in satellite and other communication networks.

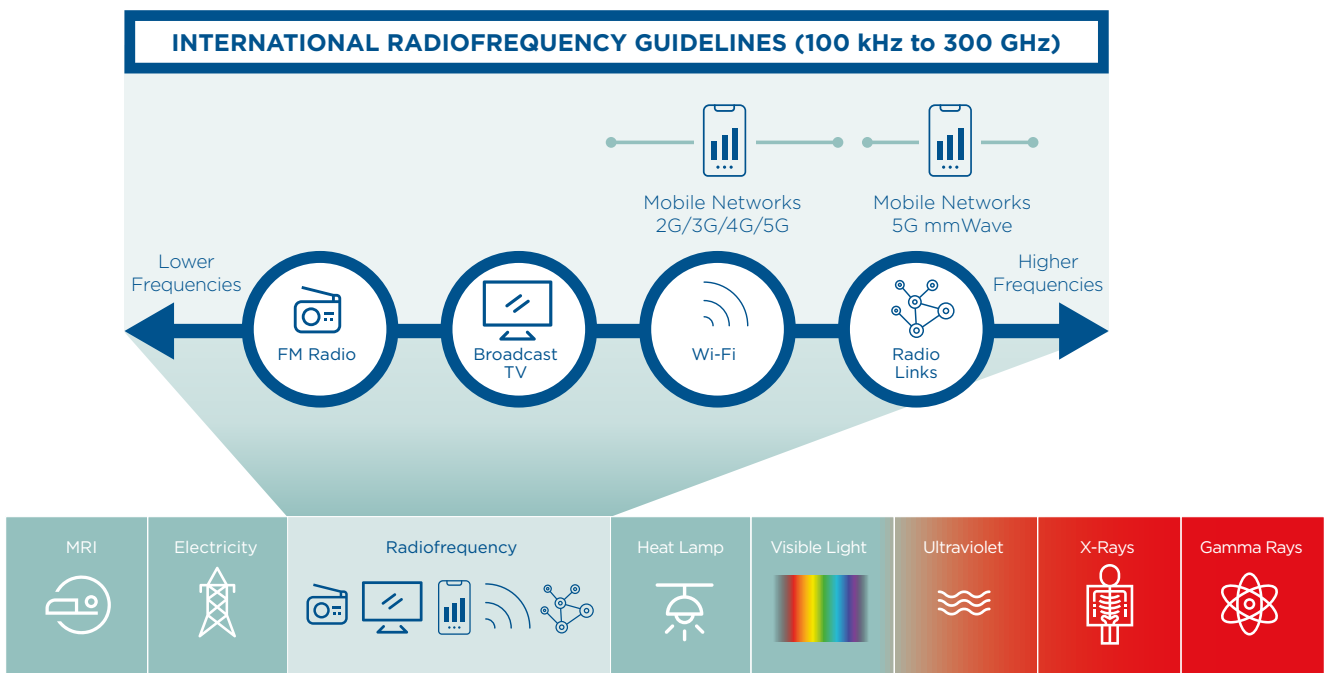
The quickly growing number of 5G use cases demands a fully coordinated, multi-layer network where 5G mmWave spectrum provides the massive capacity and low latency needed for a full 5G experience.

What is 5G mmWave?

Many initial 5G deployments are at frequencies similar to 3G/4G mobile networks and Wi-Fi. This also means that many existing antenna sites can be reused for 5G. While low- and mid-bands provide wide area coverage each has limited bandwidth, whereas 5G mmWave provides greatly increased bandwidth in localised areas for each user and enables higher density of users. 5G mmWave refers to the higher range of radio frequencies (above about 24 GHz) supported by 5G.

FIGURE 1

5G MMWAVES ARE RADIO SIGNALS

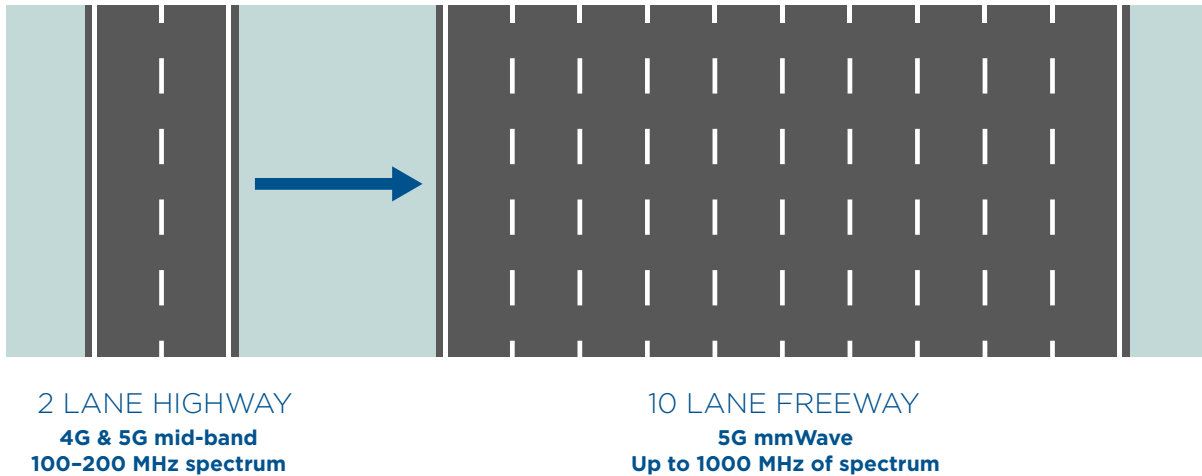


What does 5G mmWave enable?

5G mmWave technology enables many more users and devices to connect to the internet with faster responses. 5G mmWave caters for the significant increase in people using and depending on wireless technology, the increasing number of internet-connected devices, the growth of smart cities and societies, the increase in connected vehicles, and increasing industrial automation.

FIGURE 2

5G MMWAVE PROVIDES SIGNIFICANT CAPACITY INCREASE WITH ADDITIONAL SPECTRUM

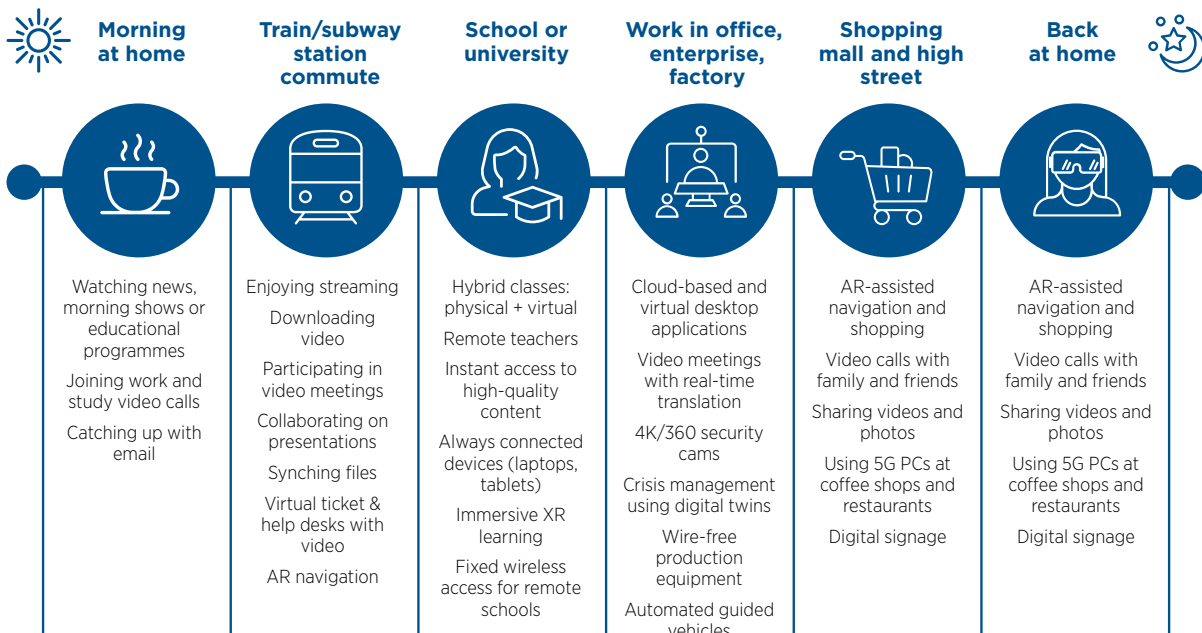


5G mmWave applications

5G mmWave applications rely on high data rates with very low latency, examples include:

- Interactive gaming
- Industrial automation
- XR services, e.g. augmented reality, virtual reality
- Connected cars
- Healthcare

5G mmWave can be used in virtually any location, for example at home, transport hubs, universities, offices and entertainment venues to name just a few.



What is the business case for 5G mmWave?

By the end of 2021, 5G had been commercially launched by nearly 180 operators in more than 60 countries. While 4G continues to support the bulk of mobile broadband users, operators are focusing their capex and technology innovation strategies on 5G.

Use cases that take advantage of the capabilities of 5G mmWave continue to emerge. A growing number of reports point to the positive business case for 5G mmWave deployments in FWA and high traffic, high-density scenarios, in both the consumer and industry 4.0 markets. Important indicators of market readiness for 5G mmWave include spectrum availability and a sufficiently wide range of consumer devices and equipment that can take full advantage of 5G's flexibility, across both 5G mmWave and sub-6GHz bands.

Please consult the GSMA website for further reading on the 5G mmWave business case: www.GSMA.com/5GmmWave

How does 5G mmWave technology work?

5G mmWave transmission works in a similar way to any other radio frequency (RF) transmission, except that the range is shorter, typically requiring a line of sight to the antenna, because 5G mmWave transmissions can be more easily blocked by objects. The range of 5G mmWave small cells placed on street furniture, such as bus shelters and light poles, will be shorter than for 5G mmWave antennas positioned on a taller structure.

The equipment used for 5G mmWave transmission and reception is smaller than the equipment used for lower frequencies (for example those used for 2G, 3G or 4G).

5G mmWave antennas support beamforming to direct the radio signal to a desired area. Conventional antennas provide coverage that is similar to how a floodlight illuminates a wide area. Beamforming antennas are like a flashlight providing coverage where it is needed and reducing unwanted signals. A few meters away from the core of the beam, the 5G signal is negligible.

FIGURE 3

CONVENTIONAL ANTENNA COVERAGE COMPARED TO THE ANTENNA WITH BEAMFORMING



5G mmWave is covered by existing international safety guidelines

National and international safety guidelines for radio waves apply to all the frequencies used for 5G, including 5G mmWave. Measurements show that total level of radio waves in publicly accessible areas from all mobile technologies, including 5G mmWave, remain well below the international safety guidelines¹.

Find out more at www.GSMA.com/5GmmWave

1. <https://www.gsma.com/publicpolicy/emf-and-health/safety-of-5g-networks/5g-emf-surveys>