



New coverage for T-Mobile 600 MHz spectrum

T-Mobile

Spectrum is the lifeblood of mobile connectivity

All wireless communication signals travel over the air via radio frequencies, which is also called spectrum. A television broadcast, a radio program, a GPS device and even your cell phone service all use spectrum – invisible airwaves to transmit bits of data. Spectrum is a finite resource and essential for so many vital communications services, but it holds no value until it is harnessed by mobile operators, creating valued services.



Spectrum Auction

In April 2017, T-Mobile purchased more than \$8 billion of 600 MHz spectrum from the Federal government. This spectrum will allow T-Mobile to improve and expand wireless services for all Americans.

Benefits of 600 MHz spectrum

T-Mobile's 600 MHz spectrum covers the Continental U.S. and will provide coverage in urban, suburban and rural communities. 600 MHz is considered low-band spectrum and is significant because these airwaves travel farther and are less hindered by obstacles like foliage, rain and buildings. Due to the size of the wavelength, the antenna equipment used to transmit the signal is 6' to 8' in length which maintains efficiency and performance.

To achieve operational efficiency, T-Mobile uses technology called Multiple-input Multiple-output or MIMO. A MIMO system widens the broadcast “pipeline,” allowing more data to flow through the same block of spectrum at a time. MIMO can be used to enhance the capacity and coverage of a radio signal for customers.

T-Mobile currently deploys a 4x4 MIMO system with 600 MHz antennas. That means four transmitters and four receivers are required so that multiple data signals can simultaneously use the same block of frequencies. This allows our cell sites to “speak louder” and “hear better.”



600 MHz spectrum

T-Mobile's spectrum

The Federal Communications Commission (FCC) is the government agency that regulates who is using what spectrum and for which purposes. The agency grants licenses to use the spectrum and requires licensees to avoid interference. Most of T-Mobile's licenses to operate are in the 600, 700, 1900, and 2100 MHz spectrum bands. Each band offers different benefits and requires unique technologies and deployment configurations to transmit data.

The nation's first 5G network – a look ahead

Demands for mobile services show no signs of slowing. Users are consuming more content than ever before and data traffic continues to rise. Most Americans' currently experience wireless connectivity on 4G networks. 4G has enabled innovations in our modern digital economy, and it has spurred companies to offer conveniences like ride-sharing services, smart home and smart car products.

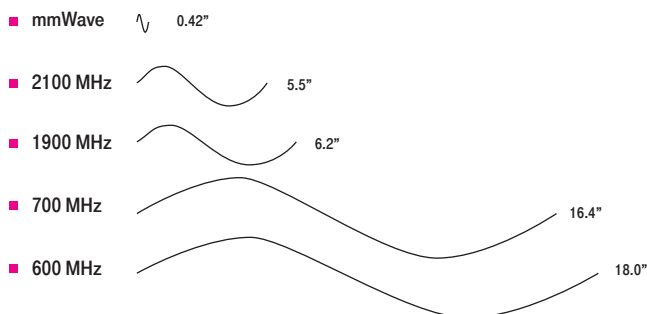
The emerging standard in voice and data communications — 5G — will offer greater speeds to move more data, lower latency to be more responsive, and higher capacity to connect more devices. This platform will drive the emerging Internet of Things (IoT) that will allow connected devices and machines from electricity meters to cars to talk to each other and transmit data through mobile connections. All industries will feel the effects of the move to 5G. Dramatic shifts are expected in many industries, especially automotive, manufacturing and health care.

T-Mobile is already deploying 600 MHz for 4G and will use this and other spectrum bands to launch 5G nationwide by 2020. The benefits of a 600 MHz network is clear — better mobile service for millions of customers — especially in rural areas.

Rural communities

Reliable broadband coverage, in America's rural communities — is a top priority for T-Mobile. 600 MHz spectrum travels farther and provides better connectivity inside homes, offices, schools and other buildings and will result in better service, especially in rural areas. This means consumers who need it will have higher quality wireless services.

Physics of each airwave for each band: The wavelength



"Because the 600 MHz wavelength is longer, it travels farther making it a good solution for more rural terrain. It also provides better in-building service than smaller, higher-band wavelengths."



The five generations of wireless technology

1G

Voice only, analog cellular phones
Max speed: 2.4 Kbps

2G

Digital phone calls, text messaging and basic data services
Max speed: 1 Mbps

3G

Integrated voice, messaging mobile internet, first broadband data for an improved internet experience and use of applications
Max speed: 2 Mbps

4G

Voice, messaging, high speed internet and high capacity mobile multimedia, faster mobile broadband
Max speed: 1 Gbps

5G

A revolution in user experience, speeds, technology, connecting trillions of devices in the IoT, supporting smart homes, smart buildings and smart cities
Max speed: 10 Gbps

T-Mobile's 600 MHz 5G nationwide network will deliver increased radio efficiency, immense numbers of connected devices, lower latency, improved reliability, longer battery life and better in-building services. With 5G, the internet will be completely mobile.