

# Wi-Fi 7

## Technology Brief

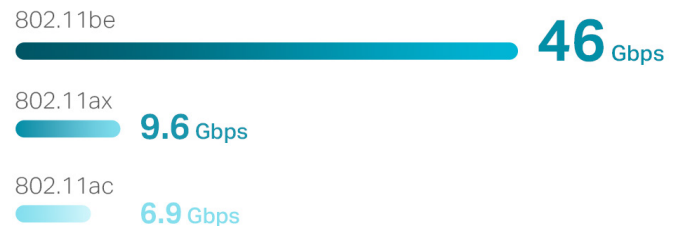
TP-Link understands the importance of the always-connected lifestyle and stands at the forefront of Wi-Fi 7. Innovatively, TP-Link combines other cutting-edge technologies with Wi-Fi 7: 10G and 2.5G multi-gigabit ports and 5G cellular networking can release the full potential of Wi-Fi 7, offering you the fastest network you have ever experienced. TP-Link's Mesh technology, the highly compatible Wi-Fi dead zone killer, provides you the simplest way to create whole home mesh Wi-Fi 7. Working with Wi-Fi 7, TP-Link HomeShield can protect your network in real time with enhanced performance for smart living. Including AI-driven mesh and Bluetooth-based location services, TP-Link is unlocking the potential of what's possible with Wi-Fi 7.

### ○ What is Wi-Fi 7 (IEEE 802.11be)?

Wi-Fi 7 is the upcoming Wi-Fi standard, also known as IEEE 802.11be Extremely High Throughput (EHT). It works across all three bands (2.4 GHz, 5 GHz, and 6 GHz) to fully utilize spectrum resources. While Wi-Fi 6 was built in response to the growing number of devices in the world, Wi-Fi 7's goal is to deliver astounding speeds for every device with greater efficiency. If you're struggling with constant buffering, lag, or congestion, a Wi-Fi 7 router may be your best solution.

Wi-Fi 7 introduces 320 MHz ultra-wide bandwidth, 4096-QAM, Multi-RU, and Multi-Link Operation to provide speeds 4.8× faster than Wi-Fi 6 and 13× faster than Wi-Fi 5. With these breakthroughs, Wi-Fi 7 can unlock more scenarios than ever before.

#### Extremely High Throughput up to 46 Gbps



### ○ What Wi-Fi 7 Offers?



#### 4.8× Faster

Wi-Fi 7 accelerates throughput up to 46 Gbps.



#### 100× Lower Latency\*

Ultra smooth Wi-Fi with 4× lower latency than Wi-Fi 6/6E routers enables emerging applications to always run at top performance.



#### 5× Network Capacity\*

With 320 MHz and MLO (Multi-Link Operation), Wi-Fi 7 provides up to 5× greater capacity than Wi-Fi 6.

\*Data is from laboratory tests. Maximum wireless signal rates are the physical rates derived from IEEE Standard 802.11 specifications. Actual wireless data throughput and wireless coverage are not guaranteed and will vary as a result of network conditions, client limitations, and environmental factors, including building materials, obstacles, volume and density of traffic, and client location.

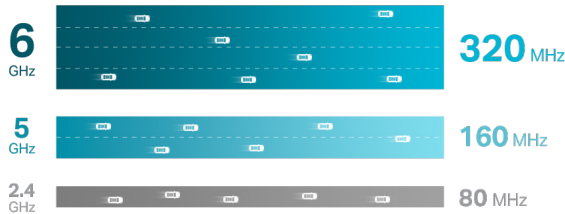
### ○ How Does Wi-Fi 7 Work?

The 11be project aimed to realize goals related to higher nominal data rates, higher spectral efficiency, better interference mitigation, and RTA support. To achieve these goals, the 802.11 working group discussed approximately 500 proposals from different fields that can be mapped to the following seven directions of Wi-Fi 7: EHT PHY, EDCA with 802 TSN Features, Enhanced OFDMA, Multi-Link Operation, Channel Sounding Optimization, Advanced PHY Techniques, and Multi-AP Cooperation. After further evaluation and verification, these technical directions were grouped into physical layer (PHY) innovation and medium access control (MAC) innovation.

## Up to 320 MHz on 6 GHz

### Double the Width, Double the Speed

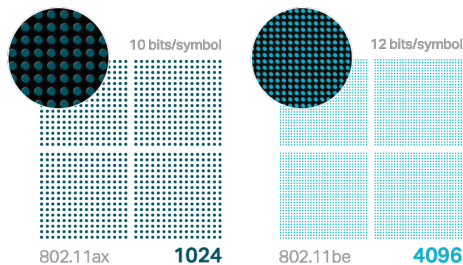
Wi-Fi 7 unleashes the full potential of the 6 GHz band to double the bandwidth of the last generation. Extending channel width to 320 MHz also enables many more simultaneous transmissions at the fastest possible speeds.



## 4K-QAM

### Packs 120% Data for Higher Speeds

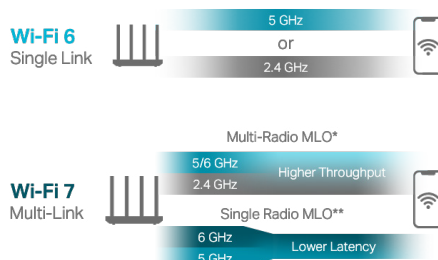
To enhance peak rates, Wi-Fi 7 uses 4096-QAM, enabling each symbol to carry 12 bits instead of 10, resulting in 20% higher theoretical transmission rates compared to Wi-Fi 6's 1024-QAM. This higher transmission rate improves efficiency, allowing for flawless 4K/8K video streaming, lag-free online gaming, and smooth live streaming. With 4096-QAM, streaming quality is significantly improved.



## Multi-Link Operation

### Higher Speed, Lower Latency, More Reliable

Traditional Wi-Fi devices use a single link to transmit data. With different Multi-link Operation (MLO) Modes, Wi-Fi 7 enables devices to use multi-link aggregation to achieve higher throughput, lower latency, and higher reliability; or to use multi-link seamless dynamic switching to achieve load balancing and lower latency.



\*STR-MLMR MLO Mode (Simultaneous Transmit and Receive Multi-Link Multi-Radio Operation Mode)

\*\*E-MLSR MLO Mode (Enhanced Multi-Link Single Radio Operation Mode)

## 16×16 MU-MIMO

### Double the Streams, Double the Capacity

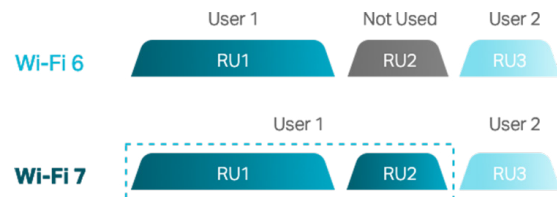
To meet the growing traffic demands from more Wi-Fi devices, APs have increased antennas and improved spatial multiplexing. Wi-Fi 7 doubles the number of spatial streams from 8 to 16, doubling the theoretical transmission rate compared to Wi-Fi 6. With Wi-Fi 7's 16 streams, every device has sufficient bandwidth to run smoothly.



## Multi-RU

### Makes Full Use of Every Resource

With Wi-Fi 6, each user can only send or receive frames on an assigned resource unit (RU), which significantly limits the flexibility of the spectrum resource scheduling. To solve this problem and further enhance spectral efficiency, Wi-Fi 7 allows multiple RUs to be assigned to a single user and can combine RUs for increased transmission efficiency.



## Preamble Puncturing

### No Waste, No Congestion

Before, busy channels meant bands could not be fully used. Data would only be sent through the primary channel. Now, with Preamble Puncturing, the interference can be blocked, opening up more channels to use.

#### Without Preamble Puncturing



#### With Preamble Puncturing



## ○ Benefits and Applications of Wi-Fi 7

As has been introduced, Wi-Fi 7 dramatically hits the peak data rates of 46 Gbps. With such a high network speed, you can enjoy 4K/8K video/AR/VR as you wish. It will change people's way of communication and deepen people's connection. Moreover, Wi-Fi 7 will change the business mode that we are accustomed to, bringing more than we can imagine.

### Benefits

#### A Real Upgrade for Businesses

Long login waits, out-of-sync virtual meetings, and congested internet environments all make getting the job done harder. For smoother and more reliable experiences, Wi-Fi 7 is key.

Run a lag-free meeting across time zones with global partners and hash out ideas. Telecommute from home with Wi-Fi 7, so you waste no time loading things from the cloud.

The higher efficiency of the next generation of Wi-Fi will bring huge value to your business.



### Application Scenarios

With Wi-Fi 7, you can surf all kinds of sites, stream flawless 4K/8K videos, and transmit any data package you need, all without having to wait for a long time. If you are a gaming enthusiast, Wi-Fi 7 will bring you an extremely real experience like never before. With both speed and delay enhancement, coupled with enhanced AR/VR, experience the wonderful integration of the virtual and real world. Telecommuting, massive video conferencing, and data cloud services will also flourish with Wi-Fi 7. Powerful internet signals will roll out everywhere you go, making everything connected.



#### Pioneers of Tomorrow

Experience the most cutting-edge technology



#### Future-minded Entrepreneurs

More efficient and fluid work experiences



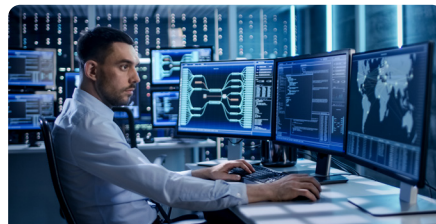
#### Lifestyle Reformers

Smarter and more powerful home networks



#### Professional Technicians

Learn and research the latest tech & products



#### Enterprise IT Ops

More economical and advanced solutions



#### Gamers

Unparalleled gaming experiences

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