



# 5G Explained

## Three Carriers, Three Different Versions

A MACH Networks White Paper



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## 5G Explained – Three Carriers, Three Different Versions

The emergence of 5G technology in the United States is currently underway, prompting a critical inquiry into the varying nuances across different carriers. Our objective is to dissect and elucidate these disparities.

Following a gradual commencement, 5G services have become accessible in the US, with major carriers such as T-Mobile, AT&T, and Verizon boasting nationwide 5G coverage, encompassing no less than 200 million individuals. Notably, the most recent flagship smartphones come equipped with 5G capabilities; yet, the implications of this advancement warrant deeper exploration.

Anticipated to flourish well into 2024, the upcoming iterations of 5G networks will serve as the groundwork for revolutionary technologies like augmented reality and autonomous vehicles, poised to dominate the forthcoming era. However, it is evident that not all carriers share an identical perspective on the potential of 5G, a trend not unfamiliar in the realm of wireless technology. Historical precedents reveal instances where carriers propagated perplexing messages, exemplified by the rebranding of 3G networks to capitalize on the burgeoning 4G trend, eventually settling on the uniform nomenclature of 4G LTE.

Nonetheless, the current landscape of 5G presents a convoluted array of divergent technologies and operational approaches, contributing to an unnecessary complexity within the realm of wireless services. To facilitate a comprehensive understanding, the subsequent breakdown delineates the specific iterations of 5G adopted by each respective carrier.,



**“5G is more than just another tech innovation. It’s a platform that makes other innovations possible.”**

**- Hans Vestberg, CEO of Verizon**

# The Distinguishing Facets of 5G Networks

Within the realm of 5G networks, three distinct iterations warrant scrutiny. While each iteration falls under the 5G umbrella, Verizon, AT&T, and T-Mobile have committed to employing diverse variations, each promising a unique user experience.

## Millimeter-wave: Expedient yet Constrained

The first variant, known as millimeter-wave (mmWave), has seen deployment by Verizon, AT&T, and T-Mobile over recent years, notably emphasized in Verizon's nationwide 5G promotion. Operating at significantly higher frequencies compared to preceding cellular networks, mmWave facilitates exceptionally rapid connectivity, surpassing the 1-gigabit-per-second benchmark in certain scenarios. Notably, its low latency renders it suitable for applications such as autonomous vehicles and remote medical procedures. However, this high-frequency technology encounters limitations in coverage over distances and struggles with building penetration. Consequently, its service coverage often remains confined to specific 5G-equipped locales like stadiums, airports, and arenas. While the integration of additional cellular radios might serve as a partial remedy, this solution remains infeasible in many instances, leaving it akin to an amplified Wi-Fi hotspot.

## Low band: Expansive Coverage, Modest Speeds

The foundational framework for the nationwide 5G services provided by all three carriers rests on low-band 5G. While outperforming 4G LTE in terms of speed, these networks do not rival the exceptional speeds achievable with higher-frequency technologies like mmWave. Nonetheless, their operational functionality resembles that of 4G networks, enabling them to extend coverage within buildings and across expansive areas.

## Midband: Balancing Speed and Coverage

Situated between the aforementioned variants, midband 5G occupies a middle ground in terms of speed and coverage. Outpacing low-band networks in terms of speed, yet possessing broader coverage compared to mmWave, this spectrum offers an equilibrium between the two extremes. T-Mobile's acquisition of Sprint was largely motivated by the spectrum owned by Sprint, a crucial factor contributing to T-Mobile's significant lead in early 5G performance. T-Mobile's midband 5G signal now extends to over 330 million individuals, showcasing average download speeds of approximately 400 megabits per second, with peak speeds reaching 1Gbps.

We're not just building a network to deliver a **new generation of broadband experiences**, we're building a platform of innovation that will drive human progress like never before."

- Andre Fuetsch,  
President of AT&T  
Labs and Chief  
Technology Officer

Although all three carriers possess substantial low-band spectrum, the use of midband spectrum has been relatively scarce due to its historical military applications, despite its beneficial attributes in the telecommunications sphere. However, the scenario shifted in 2021 following an FCC auction, which made a substantial amount of midband spectrum, known as C-band, available to wireless carriers.

Consequently, all three major operators made significant investments in acquiring these airwaves. Verizon and AT&T were the most prominent bidders in the C-band auction, with the deployment of these networks commencing in early 2022, following certain delays prompted by objections from the FAA and the aviation industry.

Presently, Verizon's C-band network spans over 230 million individuals, with plans to double this coverage by the end of 2024. AT&T, although slower in its midband rollout, intends to accelerate deployments in the latter half of 2023, aiming to encompass 200 million individuals within the next year. It is essential to recognize that no single band or spectrum variant reigns superior; each carrier envisions incorporating all three spectrum types to establish a holistic and comprehensive network infrastructure.

## The Three Flavors of 5G

In an industry renowned for its dominance in the realm of advertising, carriers have adopted diverse nomenclatures to distinguish the various iterations of 5G networks. Notably, AT&T stands out as a prominent proponent, delineating three distinct flavors: 5GE, 5G, and 5G Plus. However, it is imperative to clarify that 5GE, representing "5G Evolution," does not constitute genuine 5G technology; rather, it serves as a marketing label for 4G LTE. It is important to note that devices displaying the 5GE indicator, including the iPhone 11, Galaxy S10, or Pixel 4, do not possess compatibility with the novel next-generation 5G networks. The National Advertising Review Board previously urged AT&T to desist from promoting "5GE"; nonetheless, AT&T continues to incorporate the icon on its devices. Meanwhile, the standard "5G" designation pertains exclusively to the low-band variants. Conversely, AT&T adopts "5G Plus" to represent its millimeter-wave, midband, and C-band 5G networks.

**“More than 98%  
of the US  
population is  
covered by our  
5G.”**

**•- Ulf Ewaldsson,  
President of  
Technology at  
T-Mobile**

Verizon, in its approach, refers to its millimeter-wave and C-band 5G networks as "5G Ultra-Wideband," "5G UW," or "5G UWB" (with variations in the specific icon based on the device). While comparatively less intricate than AT&T's nomenclature, potential confusion may arise owing to Apple's utilization of Ultra-Wideband technology, notably employed in the Apple AirTag tracking system. In addition to the "5G UWB" label, Verizon designates its low-band offering as "Nationwide 5G," with devices displaying a standard 5G indicator upon connection to this network.

Previously adopting a streamlined approach with a singular nomenclature, T-Mobile has recently expanded its nomenclature to encompass two distinct classifications for this new wireless technology. It now refers to its faster midband and millimeter-wave networks as "Ultra Capacity 5G" and designates its low-band network as "Extended Range 5G."

## Summary

The arrival of 5G marks a transformative juncture for the telecommunications sector, promising a profound shift in its foundational landscape. Of particular significance, the mid-band spectrum may emerge as a beacon of promise, poised to deliver a harmonious balance encompassing speed, latency, and coverage. Notably, T-Mobile seized an early advantage, harnessing the potential of the mid-band 5G spectrum previously under the ownership of Sprint. In a concerted effort, Verizon is swiftly narrowing the gap while AT&T grapples with a perceptible descent into a progressively trailing position.

In the forthcoming years, we anticipate a strategic utilization of the expansive coverage provided by the three leading US carriers among prominent enterprises spanning multiple locations nationwide. This strategic maneuver is set to ensure optimal access to the most advanced 5G services tailored to the unique demands of their business operations. Amidst this evolving landscape, the interpretation of 5G is poised to diverge significantly, contingent upon the perspective of the respective carriers, adding a layer of complexity to the unfolding narrative.

**MACH makes it quick, easy and profitable for Service Providers, Agents and VARs to add fully managed WWAN solutions to their portfolio.**

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