

The Evolution of Mid-Band Mobile Spectrum in the US



Summary

In analysis of 10 US cities

The upper 6 GHz band is only used by:


Under
30% of all
Wi-Fi
in the US




1-5% of Wi-Fi 6/6E
connections



Mid-bands provide vital mobile connectivity



60-70%
of mobile use in the
US is indoors



85-91%
of all urban connectivity
uses mid-bands

- The 800 MHz of spectrum to be assigned in 2034 for MNOs that is outlined in the OB3 Act has aligned the US with current plans of other global technology leaders. However, the US may need more spectrum than this in the longer-term (2035-2040).
- US mobile operators are making efficient use of mid-band spectrum, achieving good 5G coverage and performance both outdoors and indoors across its largest cities. This is done primarily using 2.5-2.6 GHz (for T-Mobile) and licensed spectrum in the 3.45 GHz and 3.8 GHz bands, which fall within the global 3.5 GHz range at 3.3-4.2 GHz (for AT&T and Verizon).
- While mobile operators have made efficient use of the 380 MHz available in the 3.5 GHz range four years after its auction, the 1200 MHz made available for unlicensed use in the 6 GHz band remains under-utilised five years after its assignment.
- Continued evaluation of spectrum use by both mobile and Wi-Fi will support the best possible US mobile networks and invigorate US technology leadership.

1. US spectrum needs

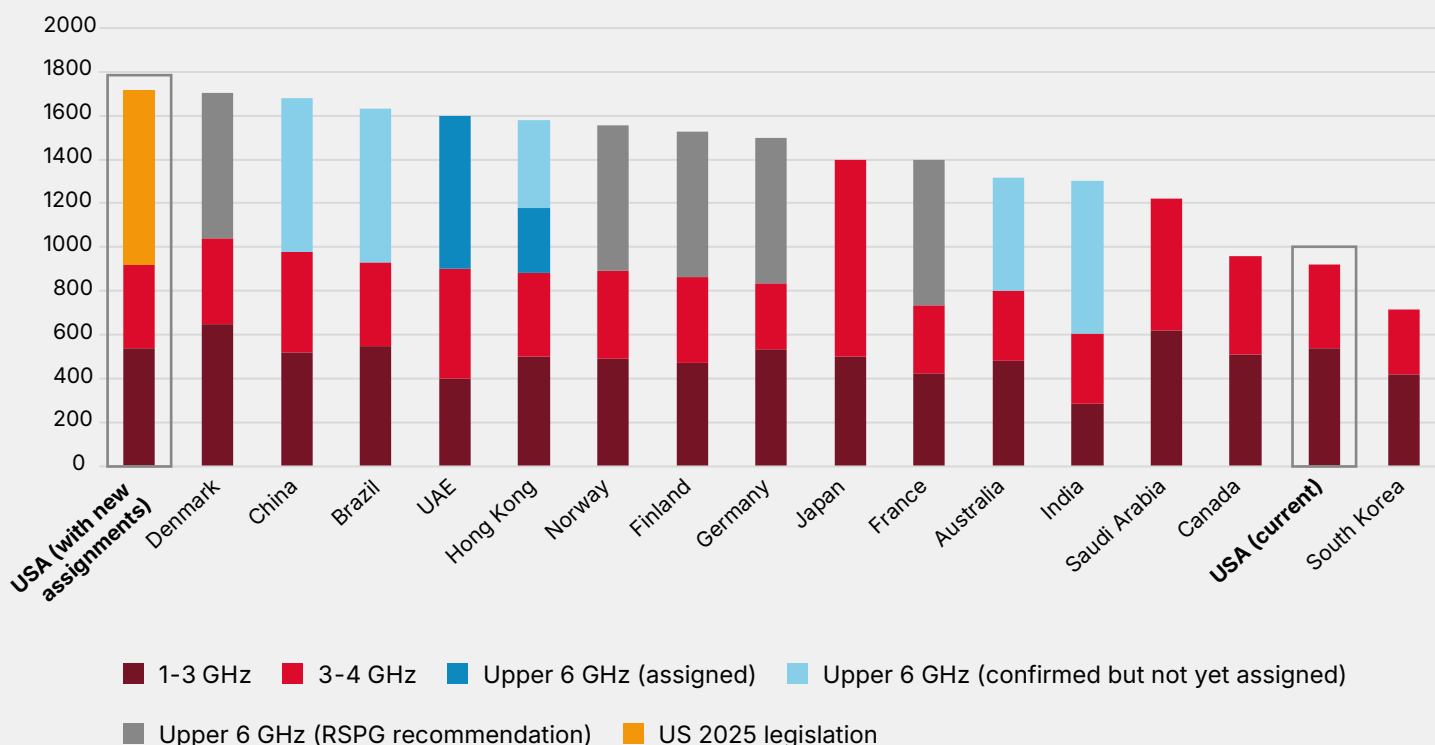
The US is expected to see increasing data usage resulting in greater spectrum needs over the next decade. Efforts are being made to provide this additional capacity, especially as the US strives to become a global 6G leader.

US aligns with global progress

Governments all over the world are assessing the spectrum needs of their mobile networks. This is both for the period to around 2030, where advanced digital nations will be seeking to provide sufficient capacity for the start of 6G, and beyond that to the end of the 2030s when spectrum needs will be higher.

The OB3 Act has sought to address the medium-term spectrum shortfall. While this aligns with work done globally to find spectrum, it does so over a broad selection of possible ranges, whereas a lot of global activity has revolved around the upper 6 GHz band. However, with the 800 MHz of additional spectrum proposed by the Act by around 2030, the US keeps on level terms with other global leaders.

Figure 1
Mid-band spectrum roadmaps in leading nations



Source: GSMA Intelligence



NORTH AMERICA



Total mid-band spectrum needs:



Average:
2.7-3.8 GHz

Spectrum needs 2035-2040

US data usage increased 32% between 2024 and 2025 according to [CTIA data](#), with demand expected to double every two years as a result.

The North American market has significant spectrum requirements for mobile networks. The GSMA estimates¹ these as being higher than the global average, although typical of higher demand countries. Global average requirements in the 2035-2040 period are 2-3 GHz. In North America, a total of 2.7-3.8 GHz of mid-band spectrum will be required by 2040.



2040 6G connections:
440 MILLION
(107% penetration)



2040 5G connections:
70 MILLION
(18% penetration)

6 GHz analysis in the US

6 GHz (5.925-7.125 GHz) has been a widely debated topic over the past five years. The band has been assigned for unlicensed technologies like Wi-Fi in the US, but many countries in the world have balanced its use with the lower part (5.925-6.425 GHz) being assigned to Wi-Fi and the upper part (6.425-7.125 GHz) being planned for licensed mobile. Countries representing 80% of the global population now plan to use the upper 6 GHz for mobile. In those countries, any spectrum in other bands – 4.5 GHz, upper 3.5 GHz and 7-8 GHz – can be planned for 6G expansion rather than needed for shorter-term requirements.

The use of 6 GHz for Wi-Fi has had limited uptake in the five years since it was launched, both in the US and globally. The GSMA has released data on this in [Europe](#), [Latin America](#), [APAC](#) and [globally](#). Our new analysis looks at ten of the most populous cities in the US. In each city, we see that use of Wi-Fi 6 (and at times Wi-Fi 7) is larger than other countries we have analysed. However, in all cases the use of the 6 GHz spectrum band to support these technologies is still very low.

This demonstrates that there is space in the 6 GHz band for both Wi-Fi and mobile to evolve. The lower band is still largely open for Wi-Fi's future development, and even the maximalist use case of three 320 MHz Wi-Fi channels (totalling 960 MHz of Wi-Fi spectrum) still leaves room for further debate about the upper 220 MHz and how that can be used for 6G. Further consideration of the upper 6 GHz band in the US would enhance its long-term spectrum roadmap, ensure global leadership and deliver flexibility and resilience against future spectrum uses. At the very least, real-world data analysis demonstrates the large quantum of spectrum available today for Wi-Fi development and shows that no further assignments for Wi-Fi are required.

1. https://www.gsma.com/connectivity-for-good/spectrum/gsma_resources/vision-2040-future-spectrum-needs/



GSMA analysis

To assess the use of mobile and Wi-Fi traffic at a more granular level, the GSMA carried out analysis of Ookla® data in 10 US cities covering an entire week in June 2025. This incorporates more than 30 million data points, including:

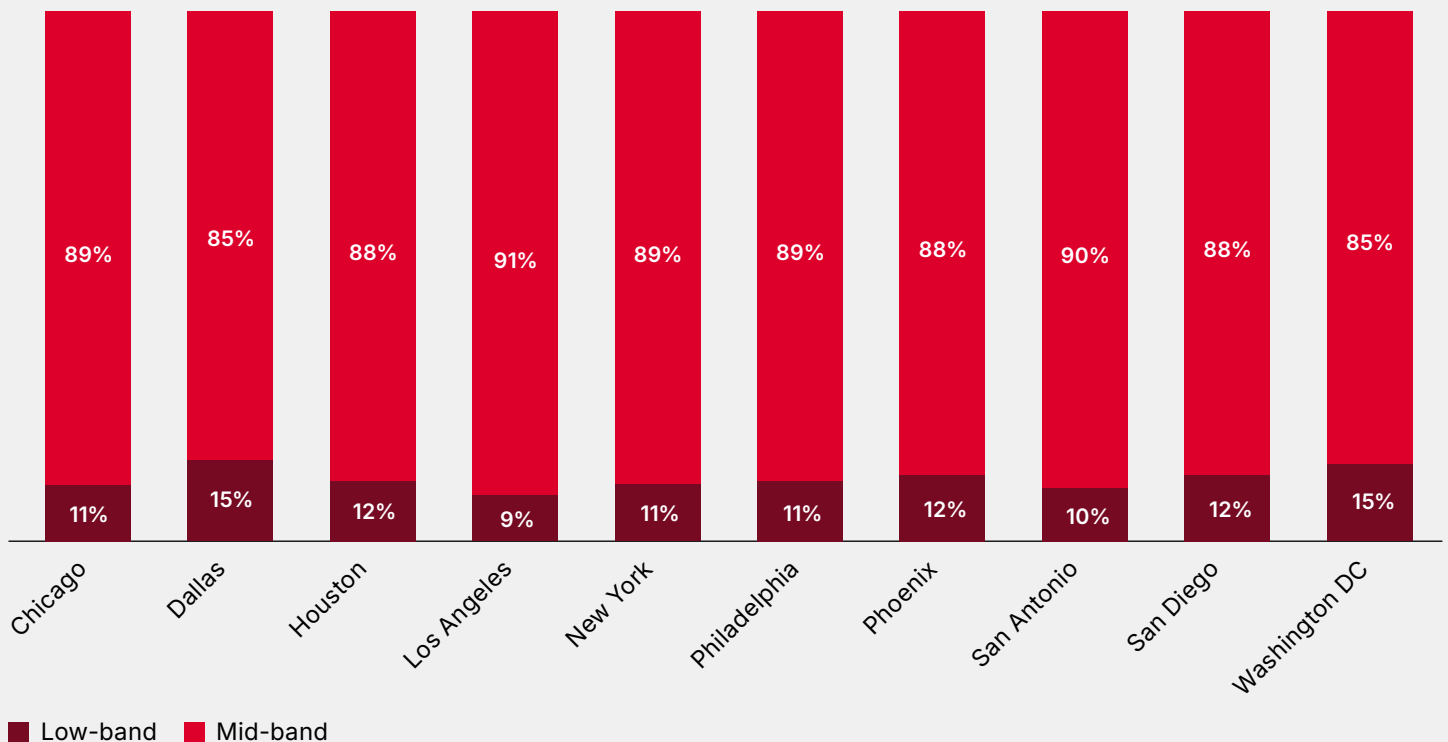
- a. Mobile coverage scans, providing data on indoor/outdoor location, connection type (4G/5G), spectrum band and signal strength. This data reflects the availability and quality of coverage.
- b. Wi-Fi coverage scans providing data on connection type (Wi-Fi 4/5/6), spectrum band and signal strength
- c. Mobile speed tests providing data on indoor/outdoor location, connection type, spectrum band and network quality (e.g. download speeds)
- d. Wi-Fi speed tests providing data on connection type, spectrum band and network quality

2. Effective mobile use of mid-bands in the US

The data analysis confirms that US MNOs rely mostly on mid-bands to provide capacity for their users. Both the 2.6 GHz and 3.5 GHz bands deliver good indoor coverage and provide a superior user experience compared to low bands. The majority of mobile use is indoors and provided by mid-bands that offer a high-quality service with good speeds.

- Most mobile usage is supported by mid-bands (indoor and outdoor)
 - Both the 2.6 GHz and 3.5 GHz bands are delivering good indoor coverage and providing a superior user experience compared to low bands
 - Current 6 GHz trials have showed thus far that upper 6 GHz can deliver comparable outdoor and indoor coverage as 3.5 GHz
 - The upper 6 GHz is therefore well-suited to meeting consumer needs both outdoors and indoors
- Today, US mobile operators use mid-bands to provide most of their capacity. This spectrum is used to cover urban areas (i.e. where most users are). For Verizon and AT&T the primary 5G mid-band is 3.5 GHz while T-Mobile uses 2.6 GHz.
- This is clearly shown in the GSMA analysis of 10 US cities using Ookla data.

Figure 2
Proportion of all mobile scans: mid-band versus low-band



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

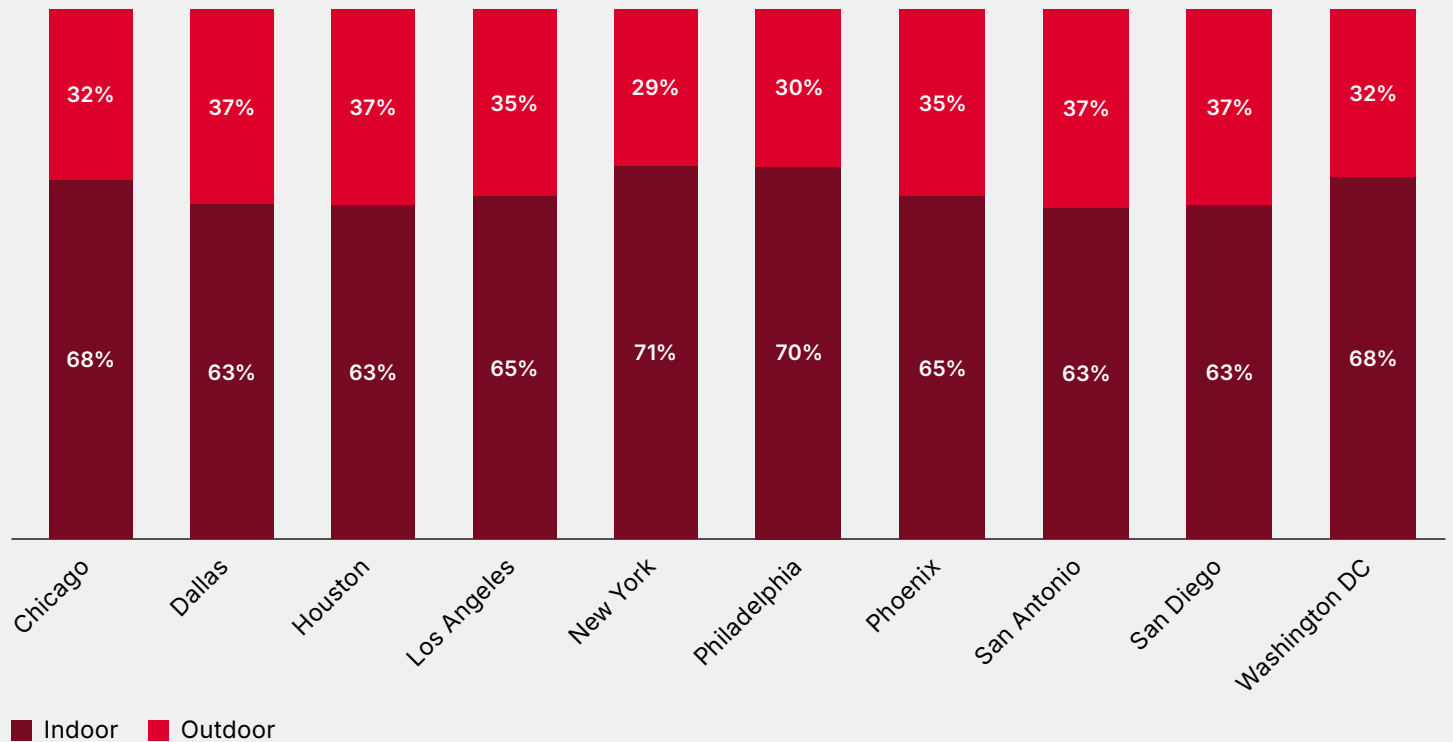


Mobile is used indoors

Data also shows that the majority (60-70%) of mobile use is indoors rather than outdoors in the US. This broadly aligns with global trends which show that 60-90% of mobile use tends to be indoors.

Figure 3

Proportion of Ookla coverage scans that are indoor / outdoor

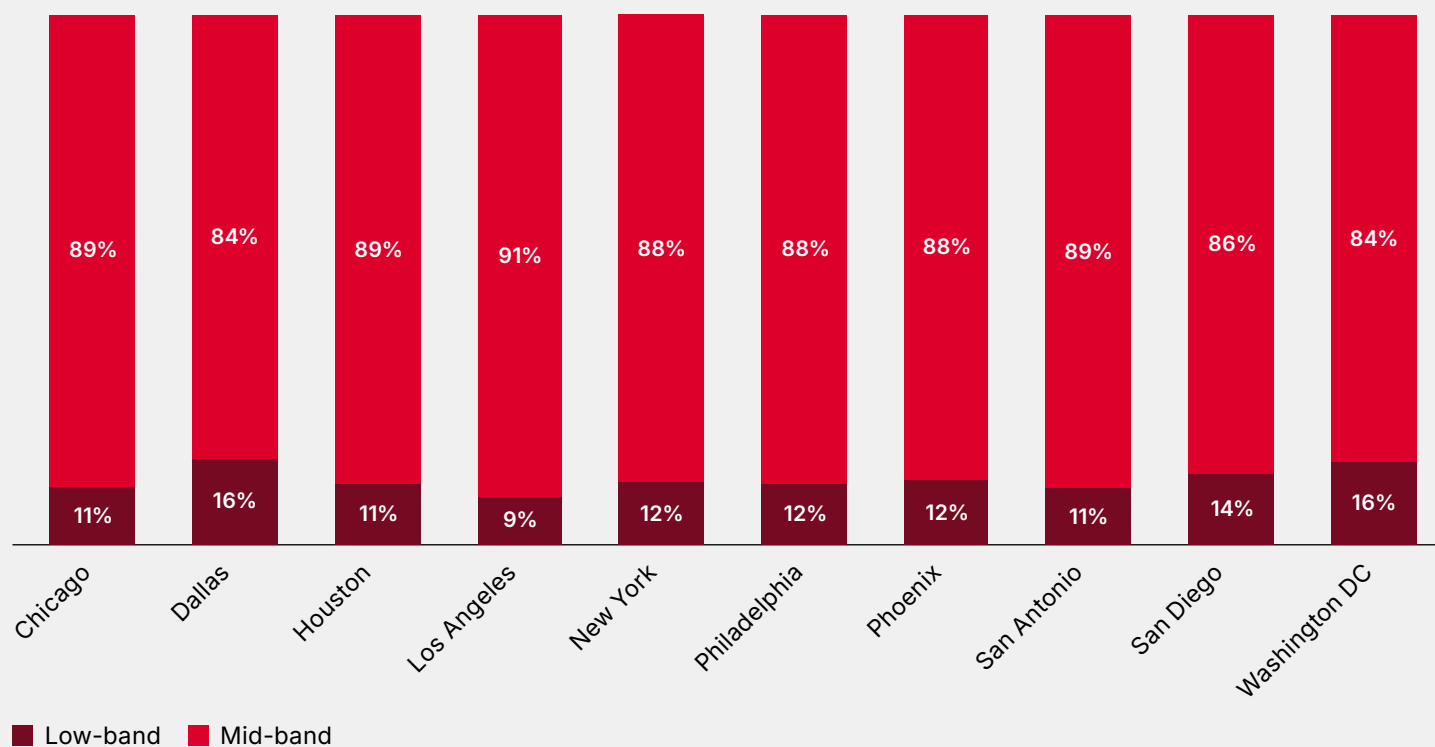


Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

Indoor coverage is provided by mid-bands

While lower frequency bands have better propagation characteristics, allowing them to reach further across wide rural areas and deep indoors, mid-bands still carry the majority of indoor 5G traffic. This is true in the US and globally. Mid-bands are used for indoor connectivity in urban areas because of the higher capacity they provide than low bands, which leads to faster user experiences. Although low bands propagate further, mid-bands still have the required characteristics to penetrate buildings and provide sufficient coverage.

Figure 4
Proportion of indoor mobile scans by spectrum band



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla



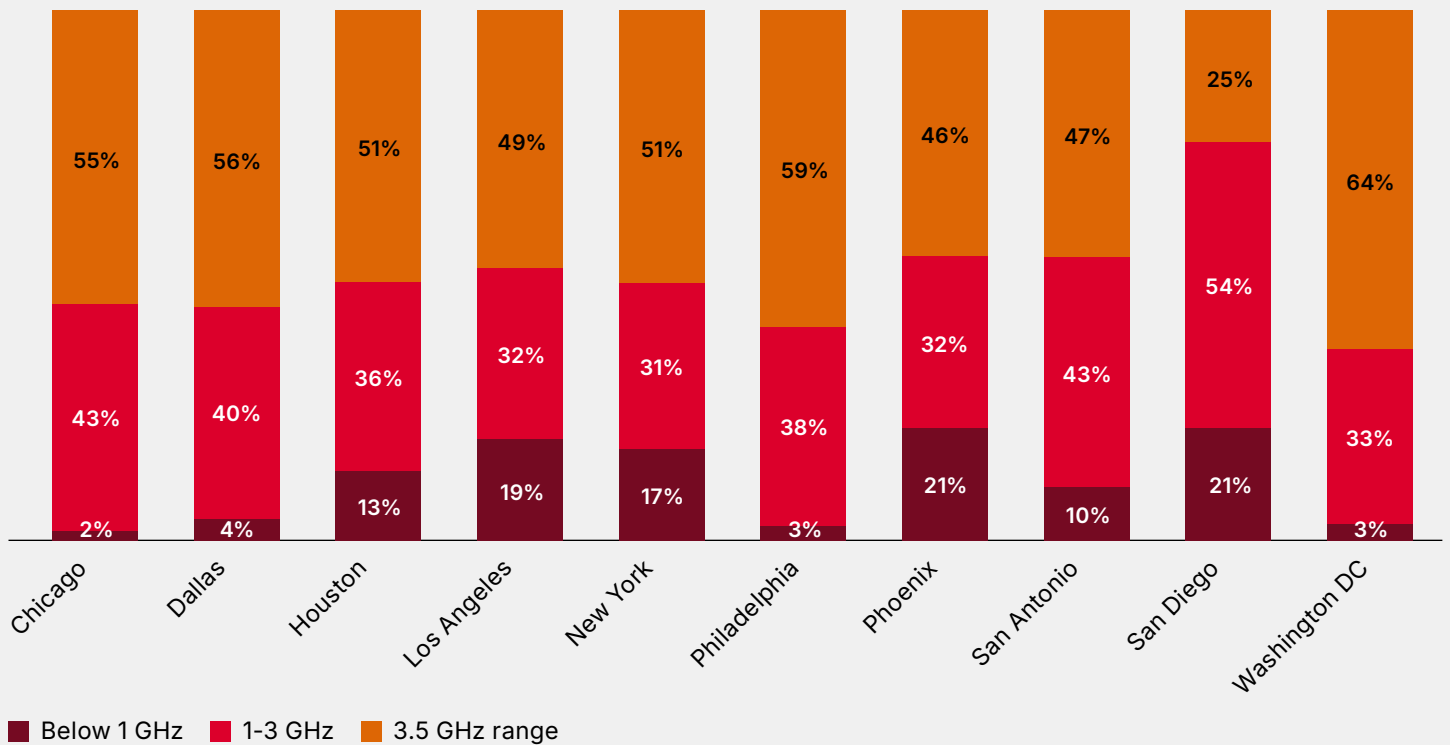


2.6 GHz and 3.5 GHz provide the majority of 5G

As T-Mobile's 5G capacity is provided by 2.6 GHz spectrum, while AT&T and Verizon use 3.5 GHz, the US has a slightly different profile from the global norm. Globally, 3.5 GHz provides nearly all 5G capacity, with lower mid-bands (1-3 GHz) being reformed in smaller tranches to provide better coverage and smaller amounts of capacity.

Therefore, we see the use of the 1-3 GHz range in the US providing more capacity than other countries when looked at as a whole. There is also added complexity in the US compared to other markets because of the different way the 3.5 GHz range is assigned. While 3.7-3.98 GHz is licensed at full power, 3.55-3.7 GHz falls under lower power CBRS licences. Meanwhile, 3.45-3.55 GHz is full power but requires coordination with government services.

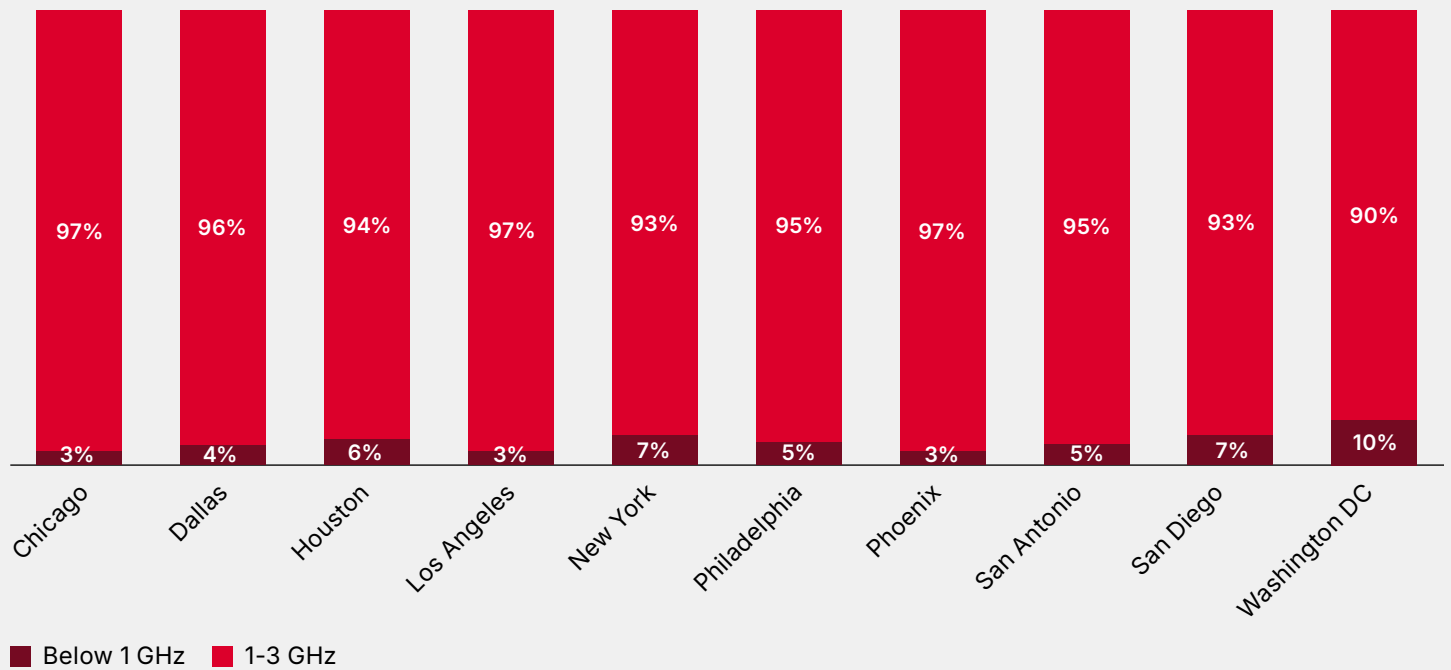
Figure 5
Proportion of 5G scans in low and mid-band spectrum by band



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

When looking at T-Mobile on its own, the vast majority of 5G use is delivered through its 2.6 GHz holdings.

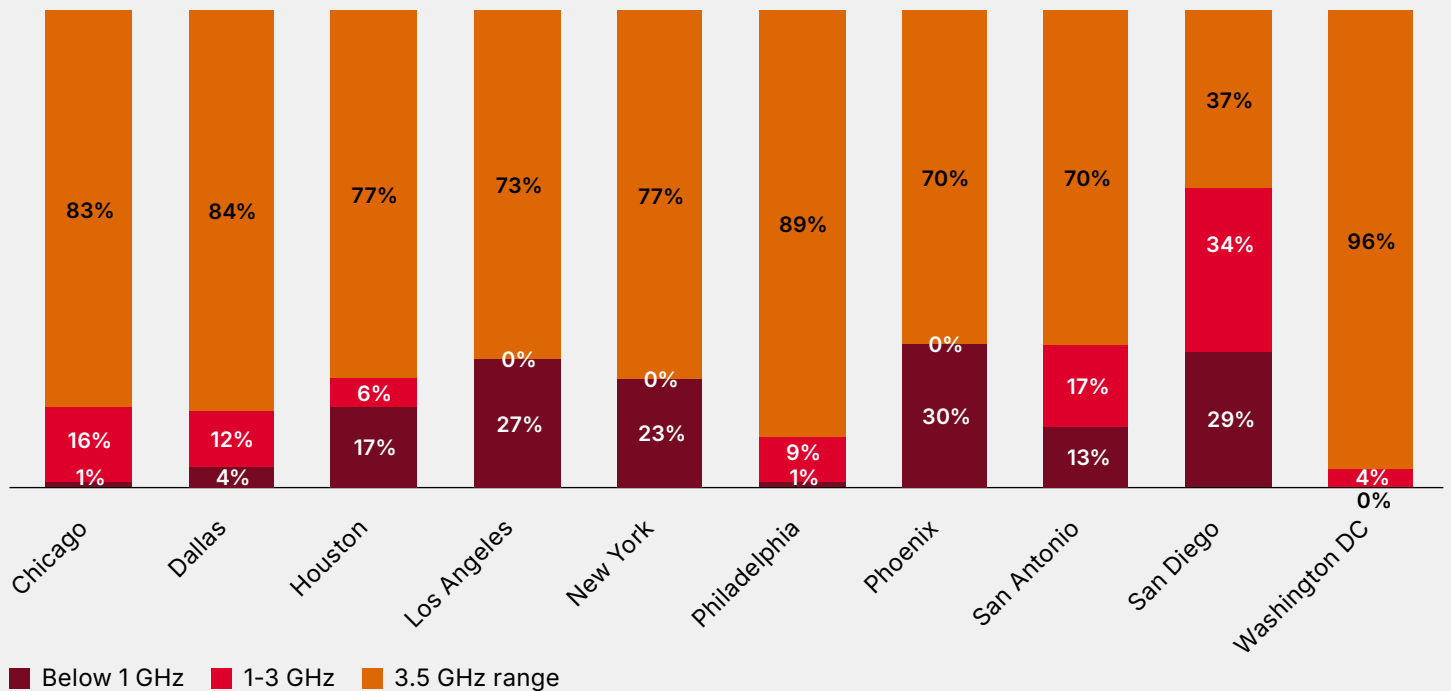
Figure 6
Low-band versus mid-band proportion of 5G mobile scans for T-Mobile US



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

Meanwhile, for Verizon and AT&T, the majority of 5G is provided by 3.5 GHz.

Figure 7
Low-band versus mid-band proportion of 5G mobile scans for AT&T and Verizon



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

3. Wi-Fi use in 6 GHz spectrum is limited

Usage for both fixed Wi-Fi and mobile is expected to increase, meaning both need capacity to evolve. The US is adopting newer Wi-Fi 6 and 7 technologies faster than other countries, however, it is not utilising these in the 6 GHz band. This follows a global trend where the lower 6 GHz band is still fallow spectrum, not yet being used and still available for the evolution of Wi-Fi without the need for further assignment.

- Analysis of the ten US cities shows a higher utilisation of Wi-Fi 6 than in many other cities we have assessed globally (including in APAC and Europe). However, a significant proportion of usage is still on Wi-Fi 4 and especially Wi-Fi 5
- Analysis shows that use of any 6 GHz spectrum for Wi-Fi is limited, five years after the spectrum's assignment (only 2 out of 10 cities in the US used 6 GHz spectrum for more than 10% of scans)
- Use of upper 6 GHz is smaller still – accounting for only 1-5% of connections, five years after the spectrum was assigned
- Mobile networks are expected to utilise spectrum efficiently via frequency re-use and base station densification. Operators generally have an incentive to do so as they face a pricing signal (auction payments or acquisition costs) as well as coverage and QoS obligations

- Fixed ISPs and Wi-Fi providers do not have the same incentives as there is no pricing signal and they do not have QoS obligations

Many countries in the world have assigned the lower 6 GHz band (5.925-6.425 GHz) for use by Wi-Fi, while some have assigned the full 6 GHz band. In all cases, even where this assignment has similarly been in place for five years, use of any 6 GHz spectrum for Wi-Fi remains low.

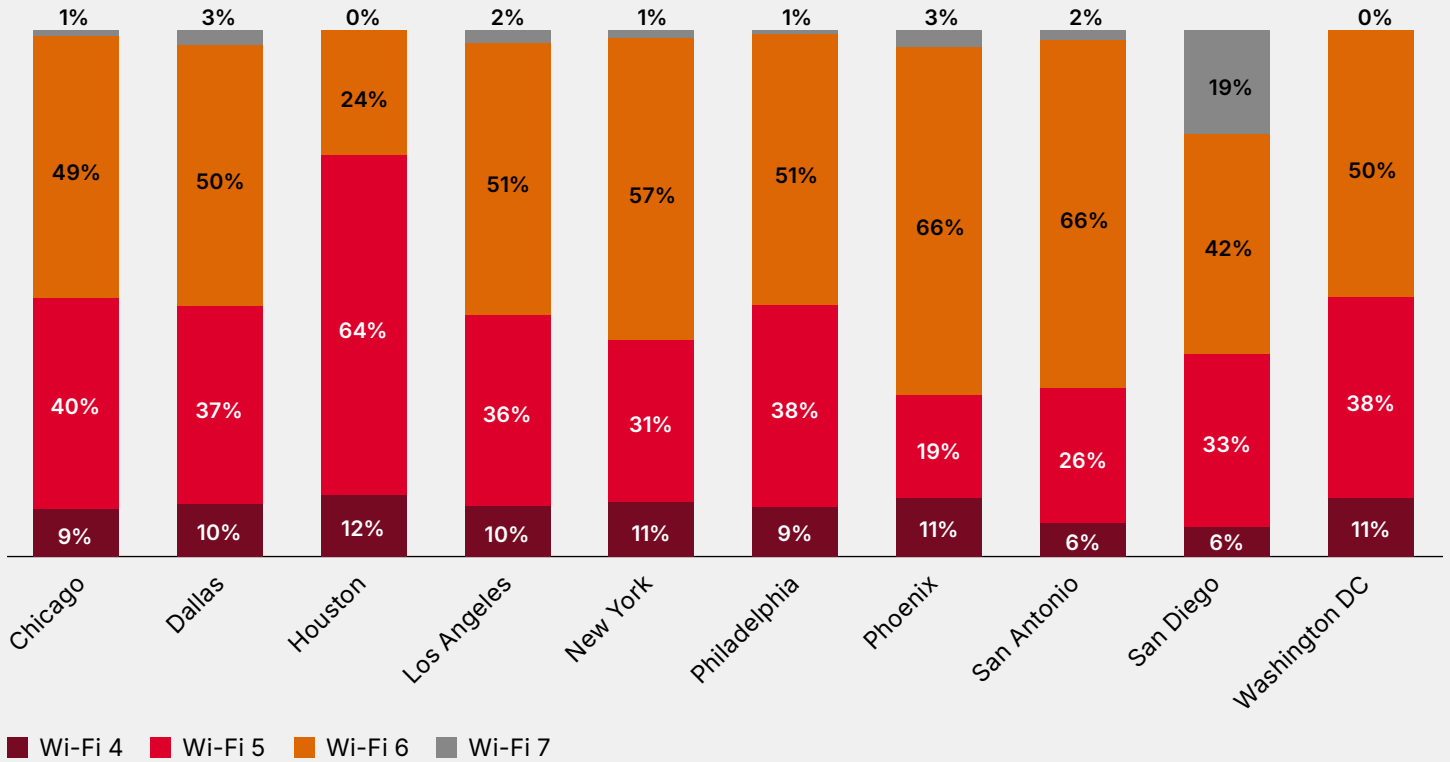
Data use is increasing on both the fixed networks that will use Wi-Fi as the access technology, and on mobile networks. Both need space to evolve, but the lack of use of Wi-Fi in any 6 GHz spectrum means that there is capacity to use the lower 6 GHz band for Wi-Fi evolution and consider the best option for the upper band.



US is a Wi-Fi technology adopter

Compared to other markets, the US has higher use of newer Wi-Fi technologies. It has phased out Wi-Fi 4 use to a larger extent than other countries while adopting Wi-Fi 6 and 7. Most US fixed line users thus have access to both technology (through Wi-Fi 6 and 7 routers) that can use the 6 GHz band for Wi-Fi and are permitted to do so by existing regulations. Despite this, as the data below shows, they are not relying heavily on 6 GHz spectrum.

Figure 8
Wi-Fi scans in the US by technology

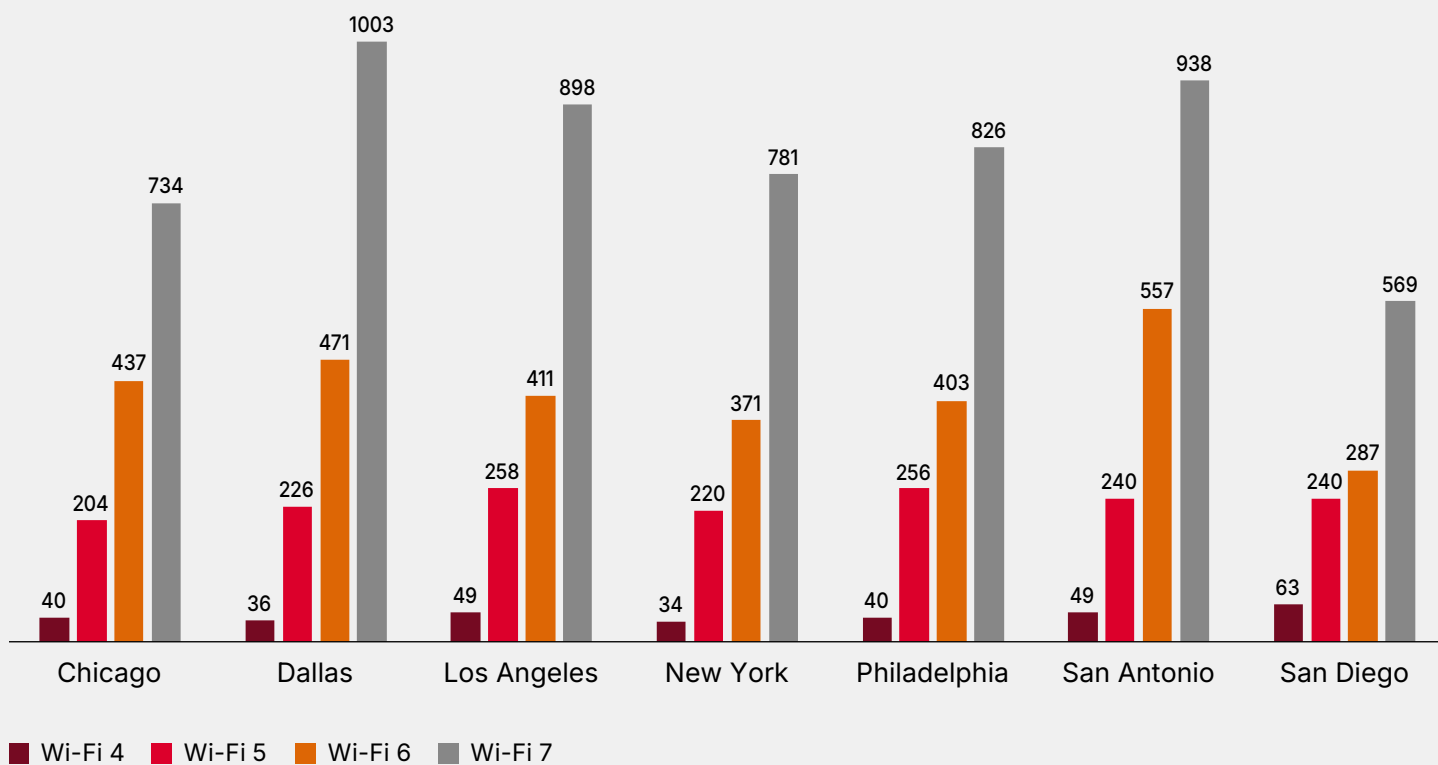


Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla



Moving to newer generations of Wi-Fi technology supports better speeds and efficiency, so continued progress on technology adoption will be a driver of better fixed-line internet quality before any new Wi-Fi spectrum is needed. It is worth noting that the step change in performance shown in the chart below is not reliant on 6 GHz, as the data relies exclusively on speeds using 2.4 and 5 GHz unlicensed bands.

Figure 9
Wi-Fi download speeds by technology (Mbps) using 2.4 and 5 GHz unlicensed bands



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla



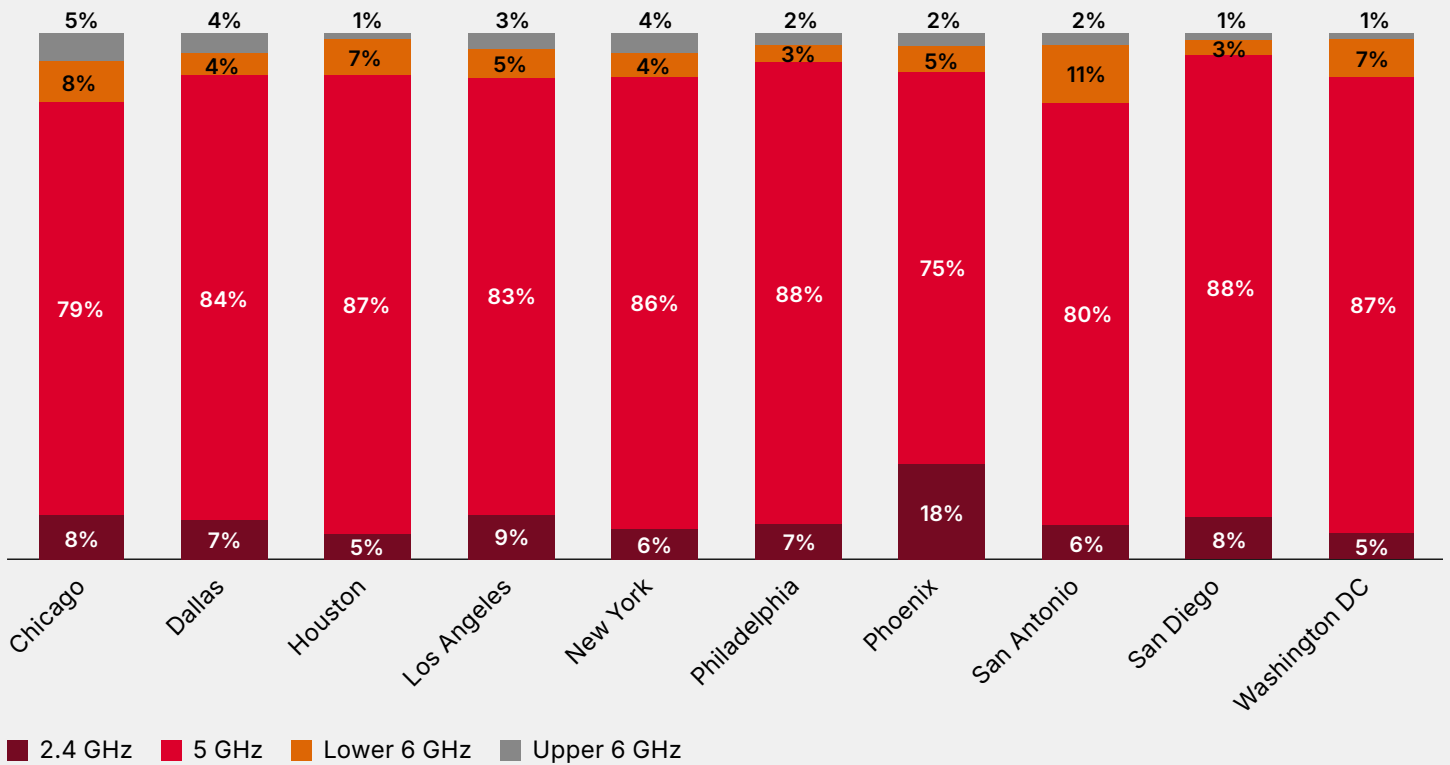
There is limited US use of 6 GHz spectrum for Wi-Fi

With early legislation and significant technology uptake, the US is well-placed to use 6 GHz Wi-Fi spectrum more than any other market. However, Wi-Fi is not making heavy use of the 6 GHz band, relying instead on the tranches of spectrum in 2.4 GHz and 5 GHz.

— In each city studied, the high Wi-Fi 6 (and Wi-Fi 7) speeds are achieved primarily with the 5 GHz band

- Across all cities, less than 15% of use is on the 6 GHz band using compatible Wi-Fi technologies
- When considering the upper part of the 6 GHz band, only 1-5% of scans utilised Wi-Fi 6/6E frequencies
- When put together with other Wi-Fi technologies, less than 3% of all Wi-Fi scans are using the upper 6 GHz band today

Figure 10
Wi-Fi 6 / 6E scans by band



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla



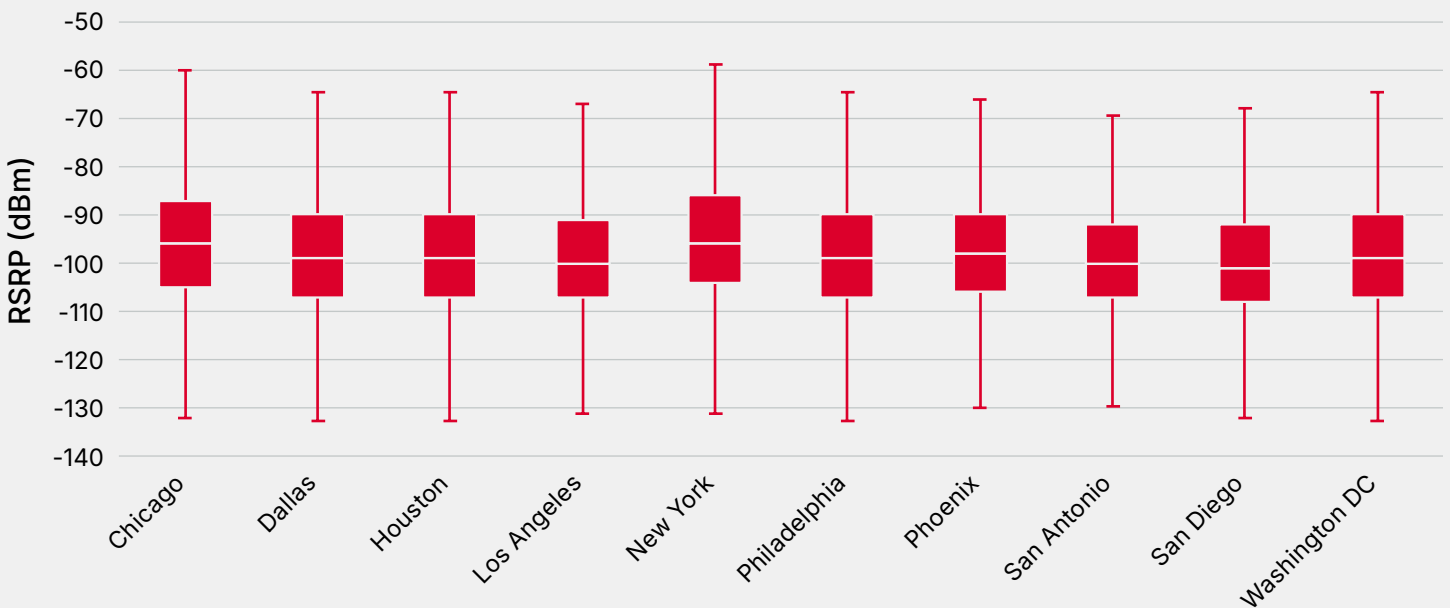
4. Mobile Quality of Service

Mid-bands provide high quality indoor coverage

Mid-bands provide most indoor mobile traffic, but do they provide sufficient quality of service and experience for consumers? The figures below show the distribution of signal strength, measured by the Reference Signal Received Power (RSRP) for indoor scans, first on mid-bands for both 4G and 5G and second on 3.5 GHz for 5G.

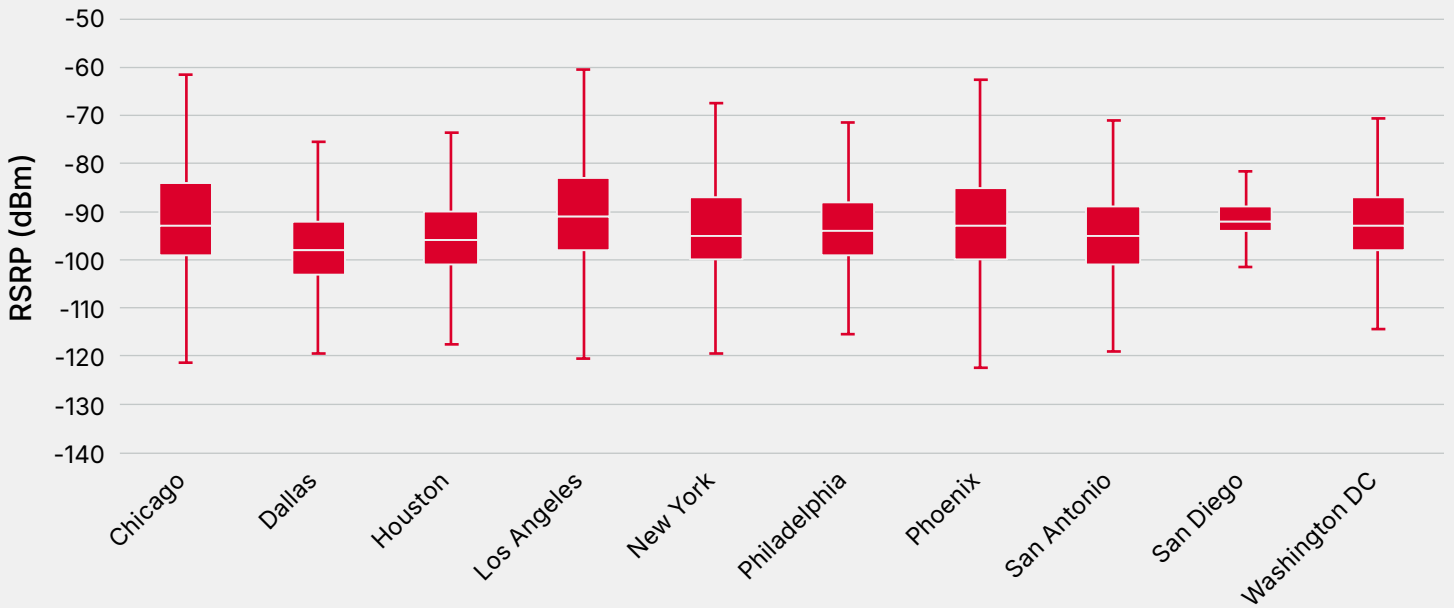
Consumers had a good quality indoor signal from mid-bands in all cities. The majority of scans have an RSRP above the thresholds typically considered for effective coverage (-115 to -105 dBm). So mid-bands are providing indoor coverage to consumers, including the 3.5 GHz today.

Figure 11
Indoor mid-band signal strength (4G/5G)



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

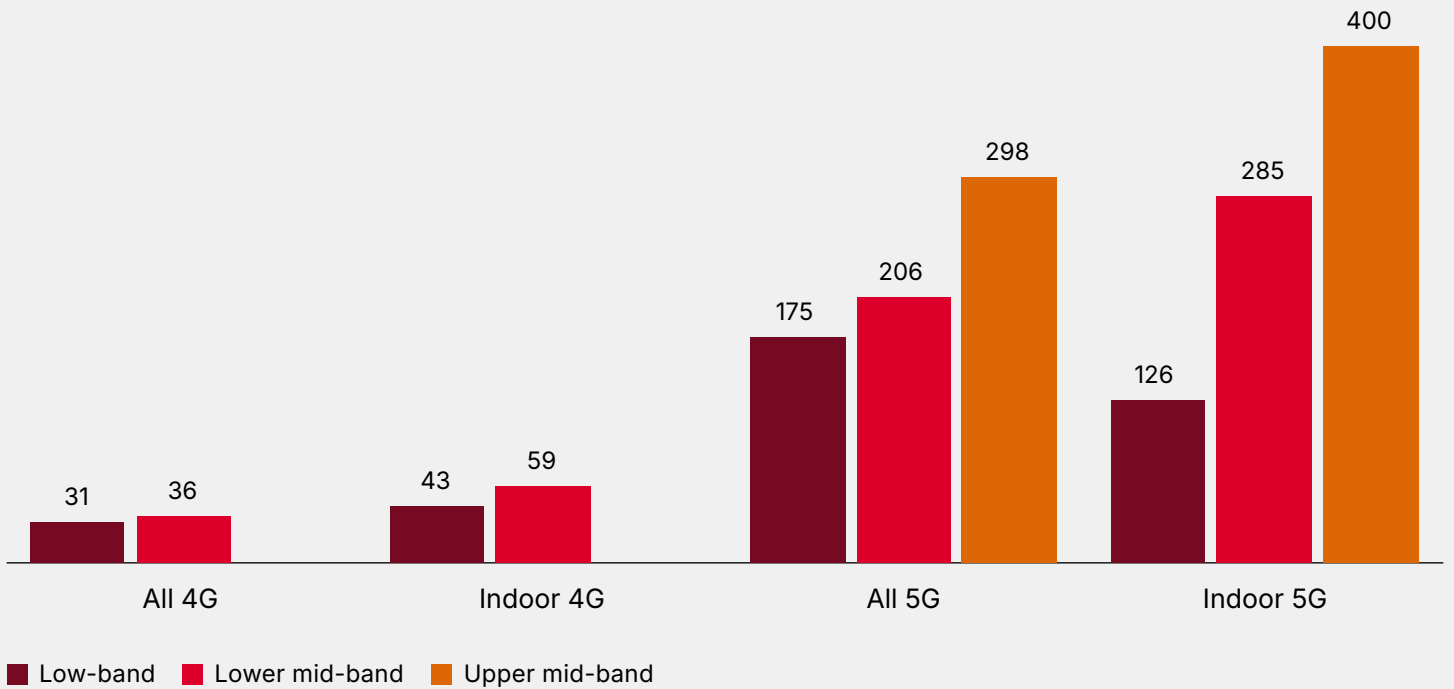
Figure 12
Indoor 3.5 GHz signal strength for 5G



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla

Furthermore, across all cities, mid-bands provides faster speeds than low bands. Taking the two MNOs which make use of upper mid-bands (AT&T and Verizon) in 3.5 GHz shows that faster overall and indoor speeds are provided by using 3.5 GHz spectrum. This is true across all mid-bands when using data from all three operators.

Figure 13
Median Indoor Download Speeds by technology and spectrum band (Mbps)



Source: GSMA Intelligence analysis, based on Speedtest Intelligence data provided by Ookla. The data on 5G speeds only consider Verizon and AT&T, as they enable a comparison of speeds in the upper mid-band (3.5 GHz range).

What next?

The OB3 Act lays out plans for the US to identify 800 MHz of additional spectrum for mobile. In the longer term, more capacity will be required in the 6G era.

Realistic evaluation of the current use of 6 GHz spectrum by Wi-Fi shows the extent to which it remains fallow. The 6 GHz band remains a new development opportunity for Wi-Fi and even maximalist use of three 320 MHz Wi-Fi 7 channels would leave 240 MHz for further consideration at the top of the band to help meet the US' spectrum needs. Future decisions could maintain spectrum for unlicensed use in an extended lower portion of the band, which would allow both

Wi-Fi and mobile to evolve and enable US 6G deployment. There is no clear rationale for further Wi-Fi spectrum assignments.

Clear assessment of the current use and future evolution of all technologies can give greater flexibility for future spectrum decisions and help maintain global leadership.

