

Next Generation Wi-Fi: Heading Off a 5G Digital Divide with Affordable Connectivity for All

March 17, 2020

Wi-Fi in 6 GHz

Agenda

The importance of Wi-Fi

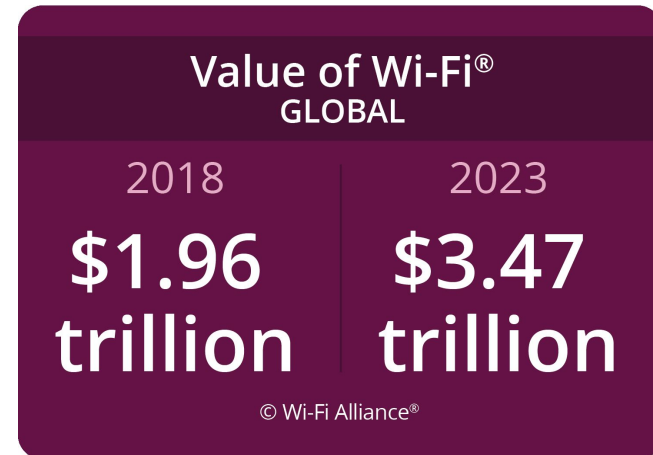
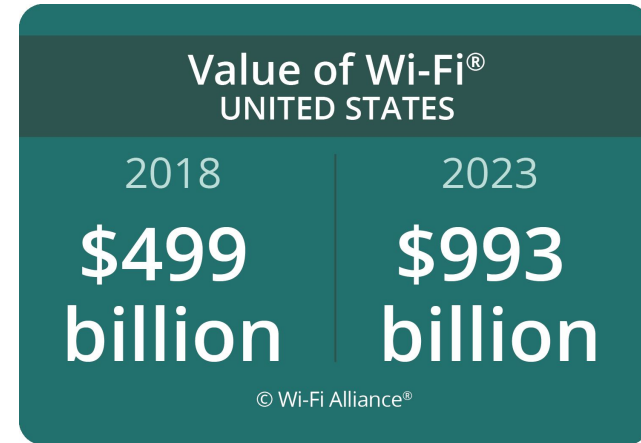
The need for more spectrum

Value of 6 GHz

Conclusions and next steps

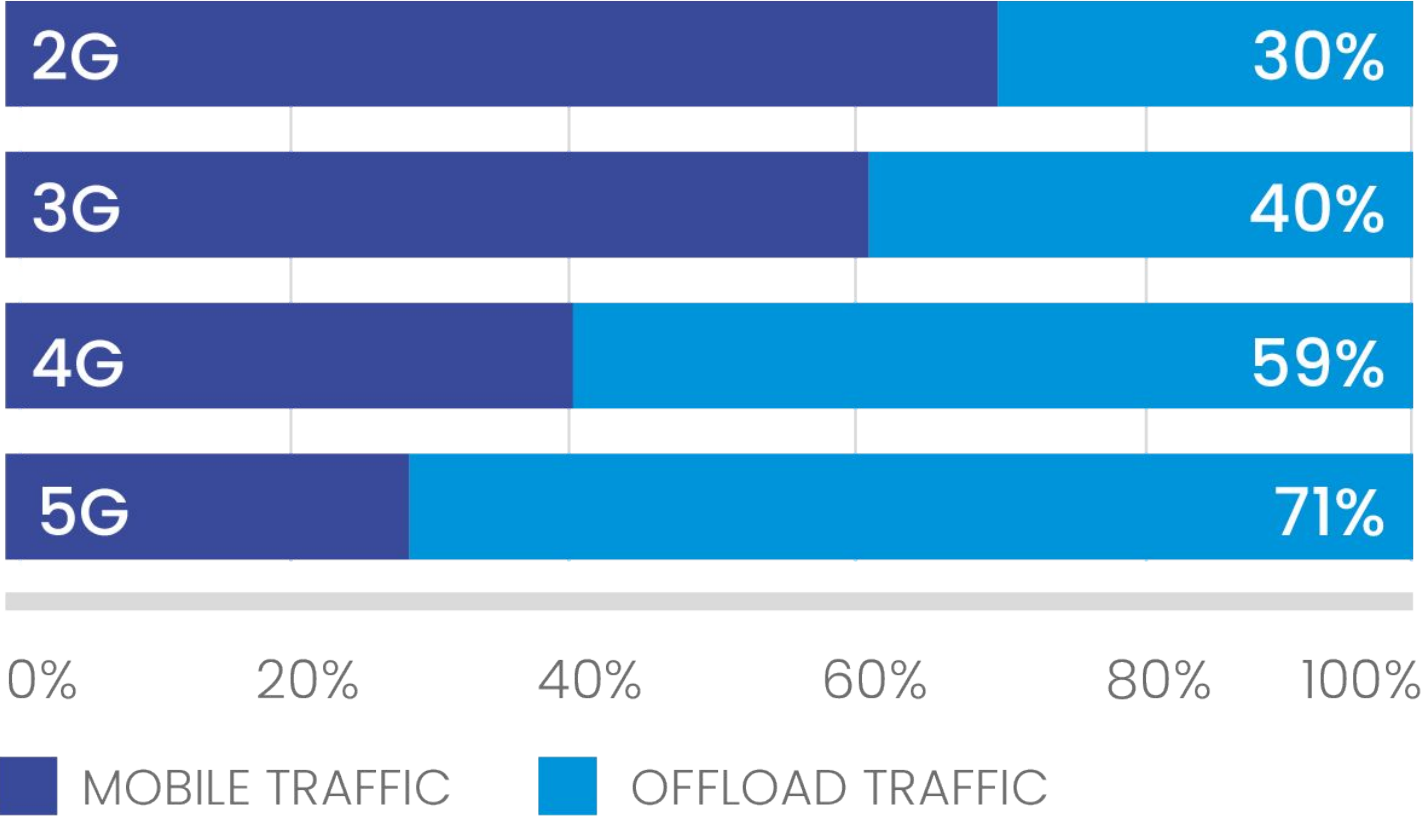
Wi-Fi is key to economic growth and societal development

- Citizens, businesses and governments increasingly rely on Wi-Fi in unlicensed spectrum.
- Mobile operators use Wi-Fi extensively to offload traffic from their networks.
- Wi-Fi drives GDP growth by providing low cost high-speed broadband access.
- Using Wi-Fi, organizations can develop innovative digital services and business models that benefit citizens & companies.



Wi-Fi is key to 5G

Today, Wi-Fi supports the offload of 54% of mobile data traffic and this is set to grow to about 70% with 5G (source: Cisco VNI).



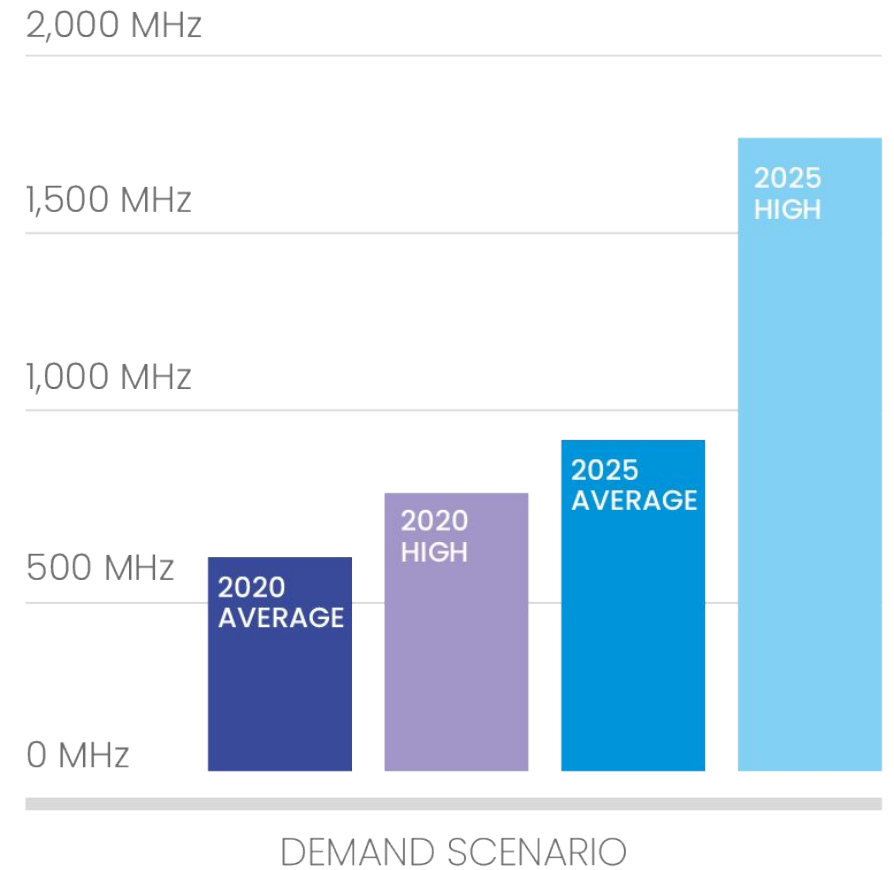
Wi-Fi 6 and 5G will work hand-in-hand

- Without the ability to offload traffic to Wi-Fi, 5G networks would be more expensive and less efficient: mobile operators would need to invest more in network densification, deploying many more small cells in dense urban areas to offer gigabit throughput.
- Wi-Fi 6 can support 5G use cases, such as HD video streaming, Wi-Fi calling, smart home devices, hotspot access, automation of city-wide services, AR/VR applications, health monitoring devices, wearables and seamless roaming.
- Robust Wi-Fi is critical to bridging the digital divide by making wireless affordable. 70% of teachers assign homework that requires internet access, making Wi-Fi an important tool in closing “the homework gap.”



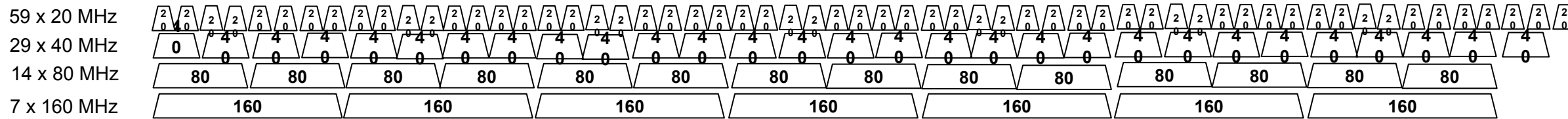
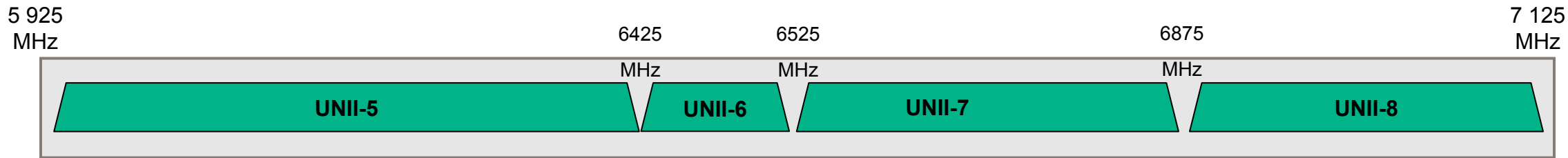
The shortage of unlicensed spectrum

- US operators are rolling out gigabit broadband networks, but the wireless interface is a bottleneck affecting the user experience.
- It has been more than 20 years since new mid-band spectrum has been made available for Wi-Fi, despite exponential growth in traffic.
- Unless action is taken, the US faces a Wi-Fi mid-band spectrum shortfall of up to 1.6 GHz by 2025 that will impact businesses and consumers (source: Quotient).



Source: Quotient, 2017

6 GHz Enables Multigigabit Wi-Fi



802.11ac Data Rates

Spatial Streams	80 MHz	160 MHz
1SS	433 Mbps	867 Mbps
2SS	867 Mbps	1.7 Gbps
3SS	1.3 Gbps	2.7 Gbps
4SS	1.7 Gbps	3.4 Gbps

802.11ax Data Rates

Spatial Streams	80 MHz	160 MHz
1SS	600 Mbps	1.2 Gbps
2SS	1.2 Gbps	2.4 Gbps
4SS	2.4 Gbps	4.8 Gbps
6SS	3.6 Gbps	7.2 Gbps
8SS	4.8 Gbps	9.6 Gbps

6 GHz RLAN Device Classes

- Very Low Power Portable (VLP) (14 dBm EIRP)
- Low Power Indoor (LPI)
- Standard Power with Automated Frequency Control (AFC)

6 GHz Very Low Power (VLP) - Short Range Wireless for AR/VR



**Mobile
AR/VR**



**UHD Video
Streaming**



**High Speed
Tethering**



**In-Vehicle
Entertainment**

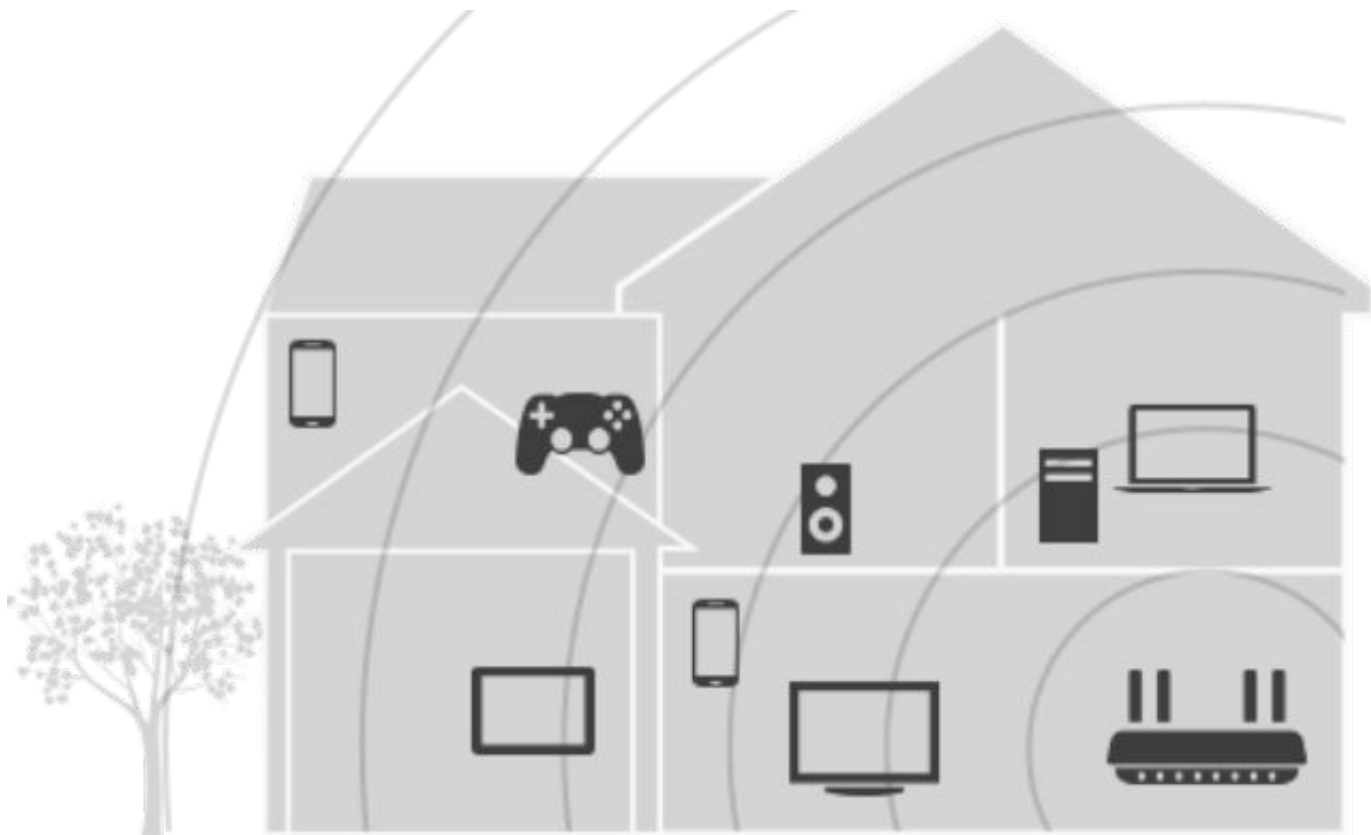
2 Gbps throughput with sub-ms latency at 3m

Next generation Mobile Peripherals enabled by 6 GHz VLP

- Critical 5G use cases such as immersive AR/VR connectivity and other advanced peripherals will rely on 6GHz VLP due to constraints on battery life, form factor and cost.
- The connection between AR glasses and a smartphone, for example, would be accomplished with a VLP device.



6 GHz Enables Robust Low Power Indoor Use Cases



6 GHz delivers **1.4 Gbps at 7m** distance even with obstructions

Use Cases

- Residential Multi-AP / mesh networks
- Multiple dwelling unit (MDU) Single-AP networks
- High-density enterprise networks
- Indoor public venues
- Industrial IoT

Standard Power Use Cases

- Up to **20 gigabit per second** outdoor coverage (e.g., parks, stadiums, LinkNYC)
- Provides **multigigabit point-to-multipoint rural connectivity**



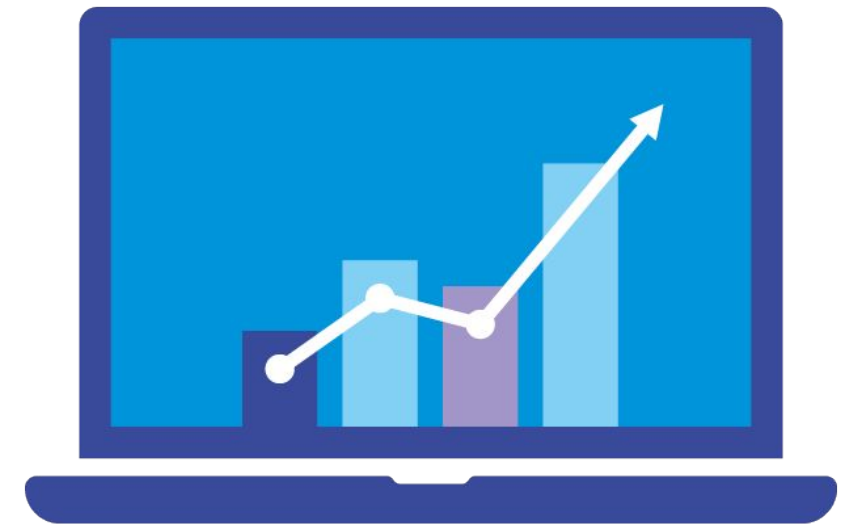
Compatibility with existing systems

- LPI and VLP devices protect incumbent operations by design
 - LPI - Lower power and indoor only (required to be plugged in, no removable antennas, cannot be weather-proofed)
 - VLP- Extremely low radiated power, dynamic power control, body loss, and antenna mismatch will prevent harmful interference to 6 GHz incumbents.
- Standard Power 6 GHz devices protect incumbent operations with Automated Frequency Control (AFC). Devices would obtain lists of permissible operating frequencies from an AFC system operator.



Summary – The US Needs to Act on Unlicensed Spectrum

- Wi-Fi is key to economic growth and societal development, key to achieving the US's connectivity goals, key to 5G's success, and key part of bridging the digital divide
- Wi-Fi's full potential can only be realized with access to more unlicensed spectrum, and the 6 GHz band is a perfect fit
- The US must act now to ensure the 6 GHz spectrum band (5925-7125 MHz) is available on a technology-neutral, unlicensed basis as soon as possible



Thank you

Trends in Personal Tech Adoption: The Future of the Digital Divide

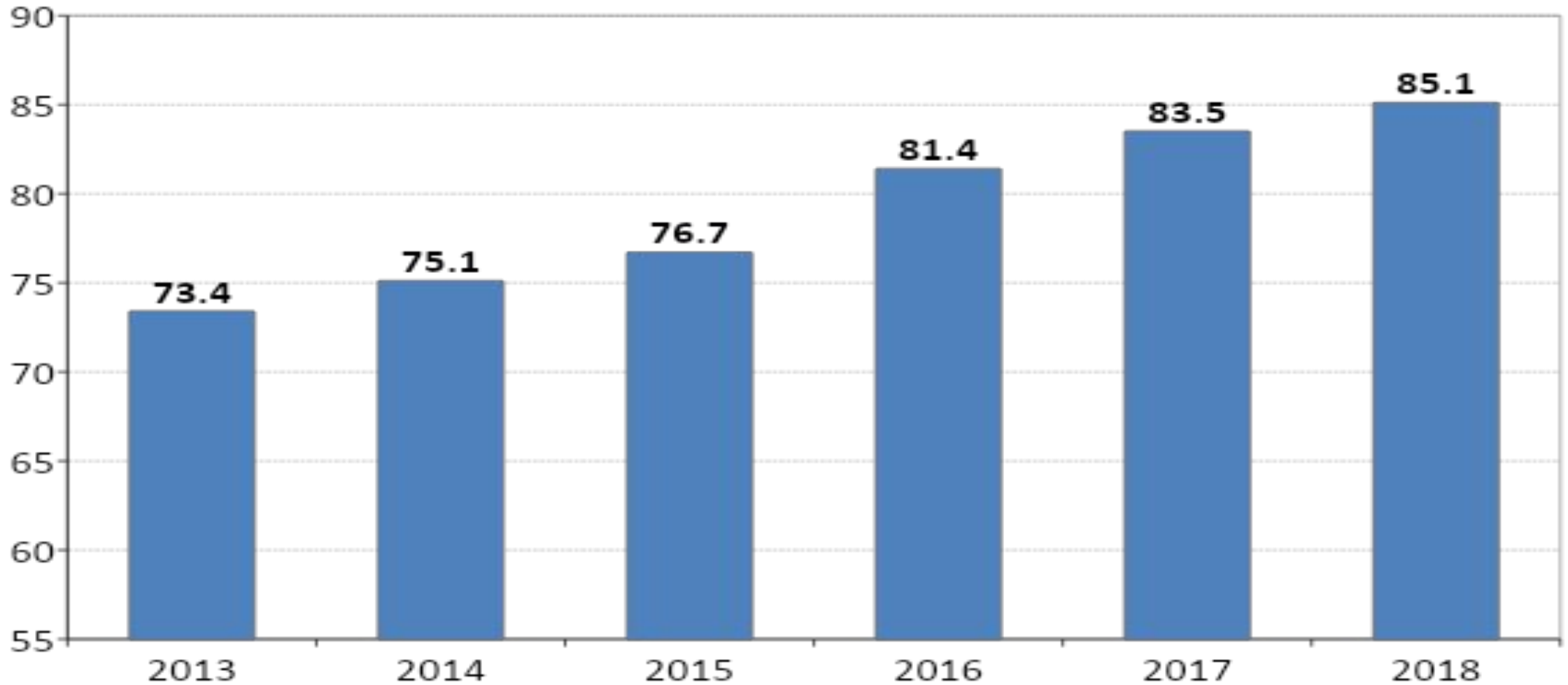
John B. Horrigan, PhD

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New America: Next Generation Wi-Fi

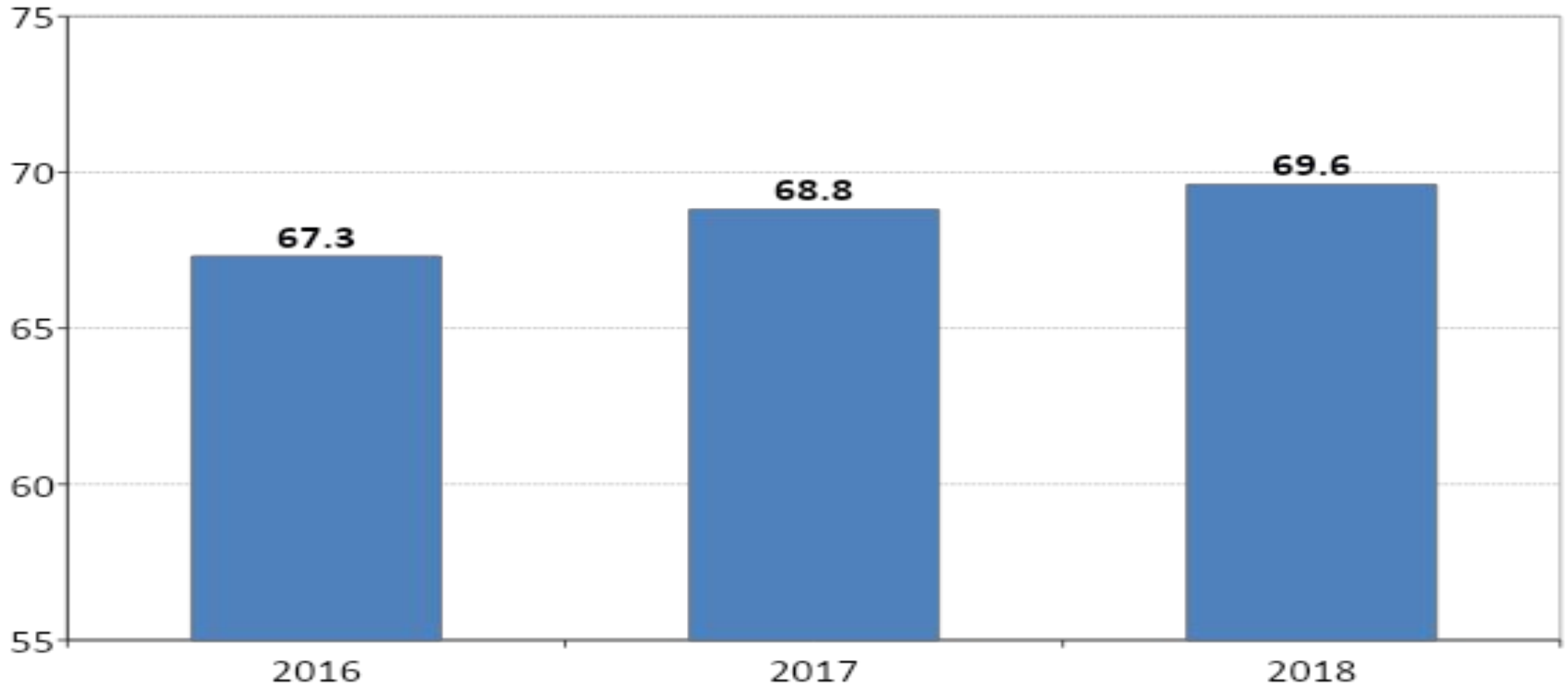
Adoption Trends

American Community Survey
(% with broadband of any type)



Adoption Trends

American Community Survey
(% Wireline broadband at home)



The Importance of Wi-Fi

- Average household has 11 wireless connected devices (Deloitte, 2019).
 - Low-income households have lots of wireless devices too!
- Among low-income households who've recently gotten home access:
 - 82% have smartphones
 - 59% stream TV or video to devices
 - 57% have a desktop or laptop
 - 53% have a tablet
- Wi-Fi important part of library experience (Pew 2016):
 - 29% of public library patrons use library computer/Wi-Fi resources
 - Most prevalent among young people & low-income
 - School/work research & health care info main uses of library tech

Implications

- The last few feet as important as last mile to consumers' online experience
 - True for all income categories
- Wi-Fi 6 is part of another tech transition, with accompanying upsides:
 - Must ensure capacity exists to serve all segments of society