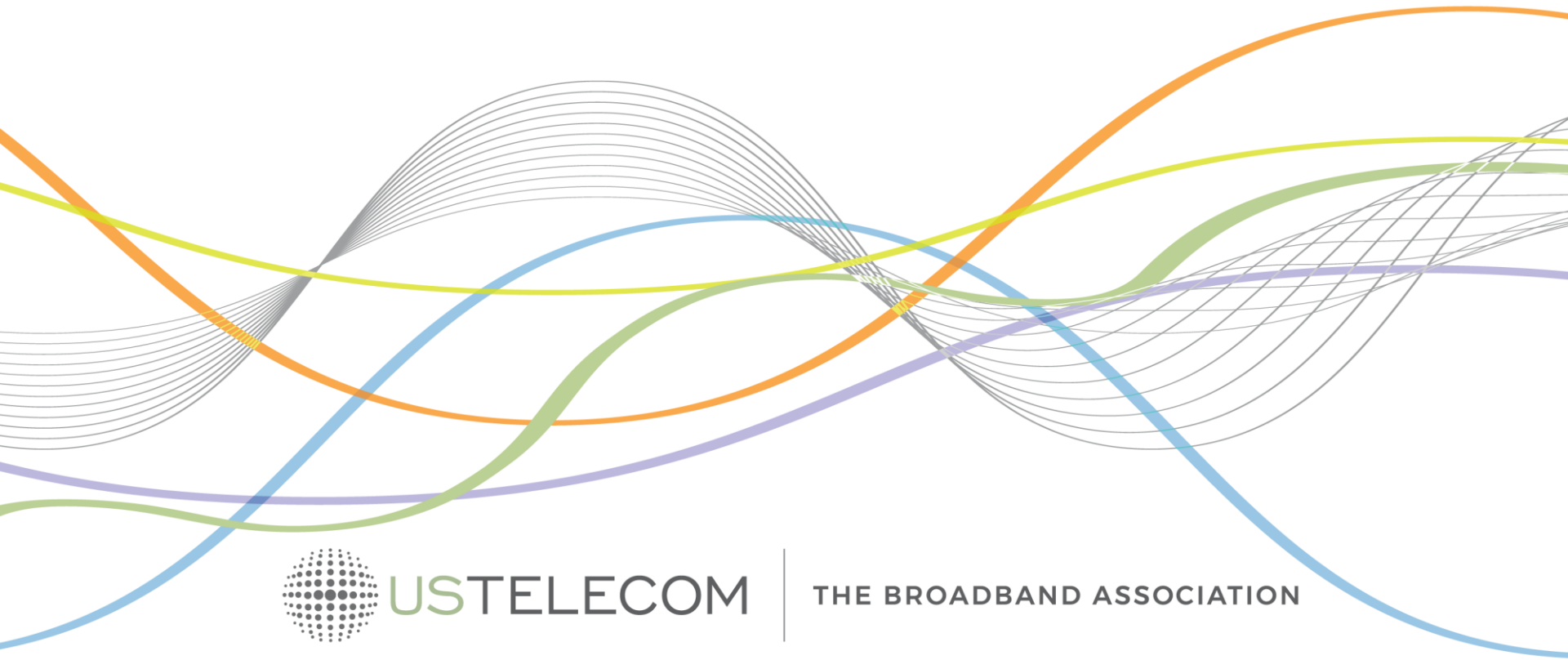
USTelecom Industry Metrics and Trends 2020

April 2020



USTELECOM | THE BROADBAND ASSOCIATION

Contents and Summary

1. Competition and technological innovation define the communications industry today
   - Consumers are choosing among a wide array of new internet-based and wireless communications services
   - Legacy regulatory structures must adapt to the new competitive dynamic
2. Investment drives broadband deployment, adoption, and innovation
   - A light-touch regulatory policy environment, and targeted government financial support for broadband has encouraged more than $1.7 trillion in investment since 1996
   - The result has been near-nationwide broadband deployment, widespread adoption of innovative services, and significant progress in narrowing the digital divide
3. Internet data traffic continues to rise rapidly and the U.S. remains a global leader
   - However, accommodating data traffic growth and maintaining U.S. International leadership will require policies that address our greatest communications and technology challenges while at the same time encouraging ongoing network investment
   - Wireline infrastructure is essential to next generation broadband and 5G wireless networks

1. Competition and Technological Innovation Define the Today's Communications Industry

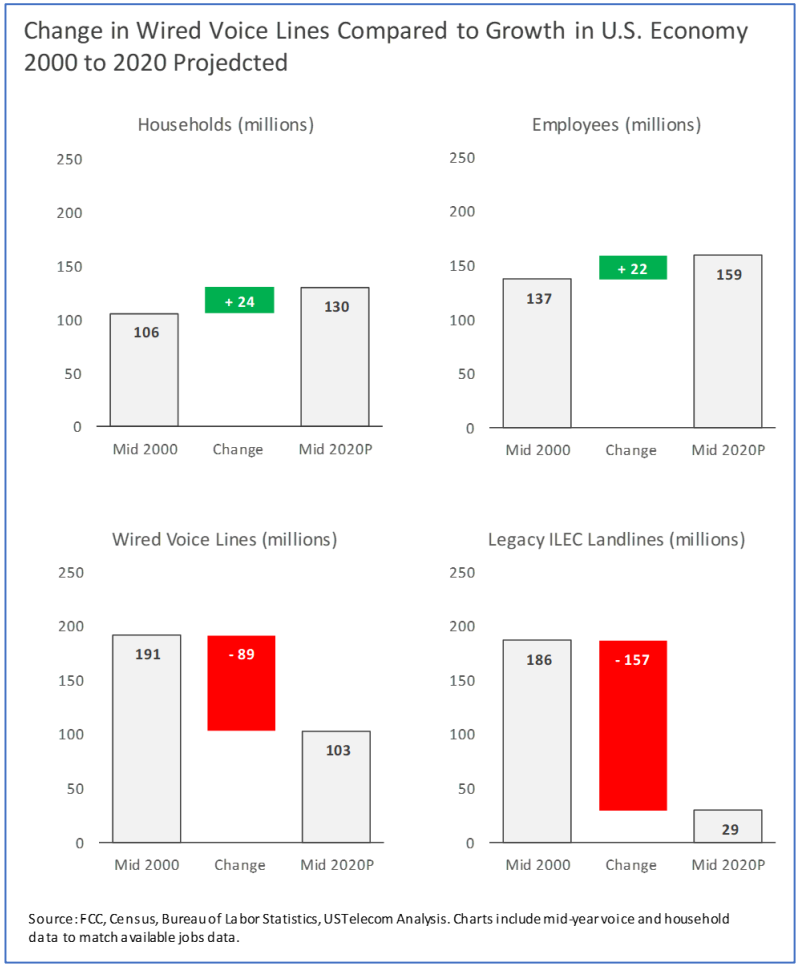
As consumers choose among a wide array of new Internet-based and wireless communications services, legacy regulatory structures must adapt to reflect the new competitive dynamic

Even as the Economy Grows, Wired Voice Is Declining As a Result of Competition and Technological Change

Since 2000, the U.S. has added 24 million households and 22 million jobs

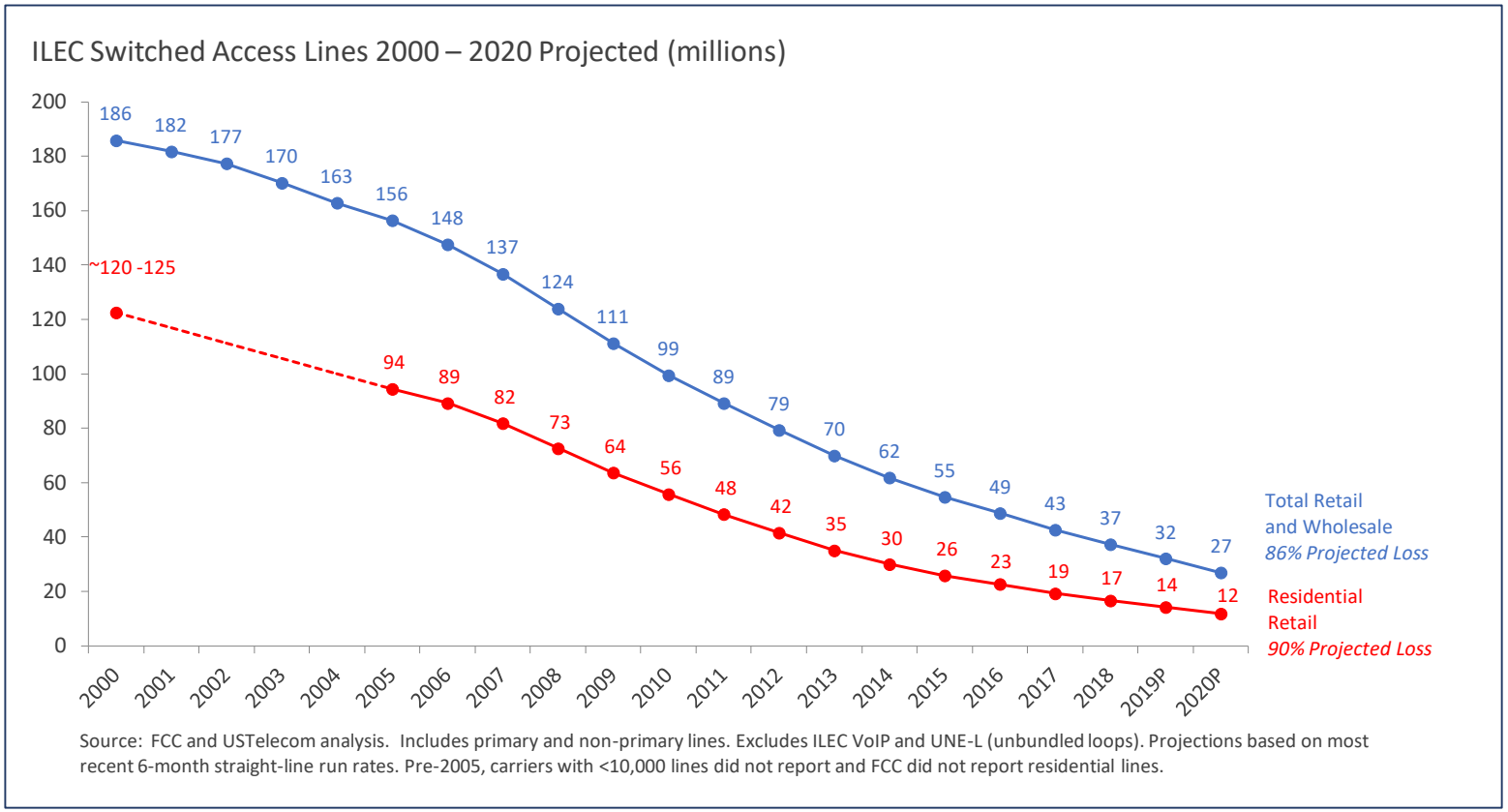
Yet, dedicated wired voice lines have fallen by 89 million during the same period

Legacy landlines have been hit the hardest, falling by 157 million, as consumers switch from traditional phone service to competitive wireless and Internet-based alternatives



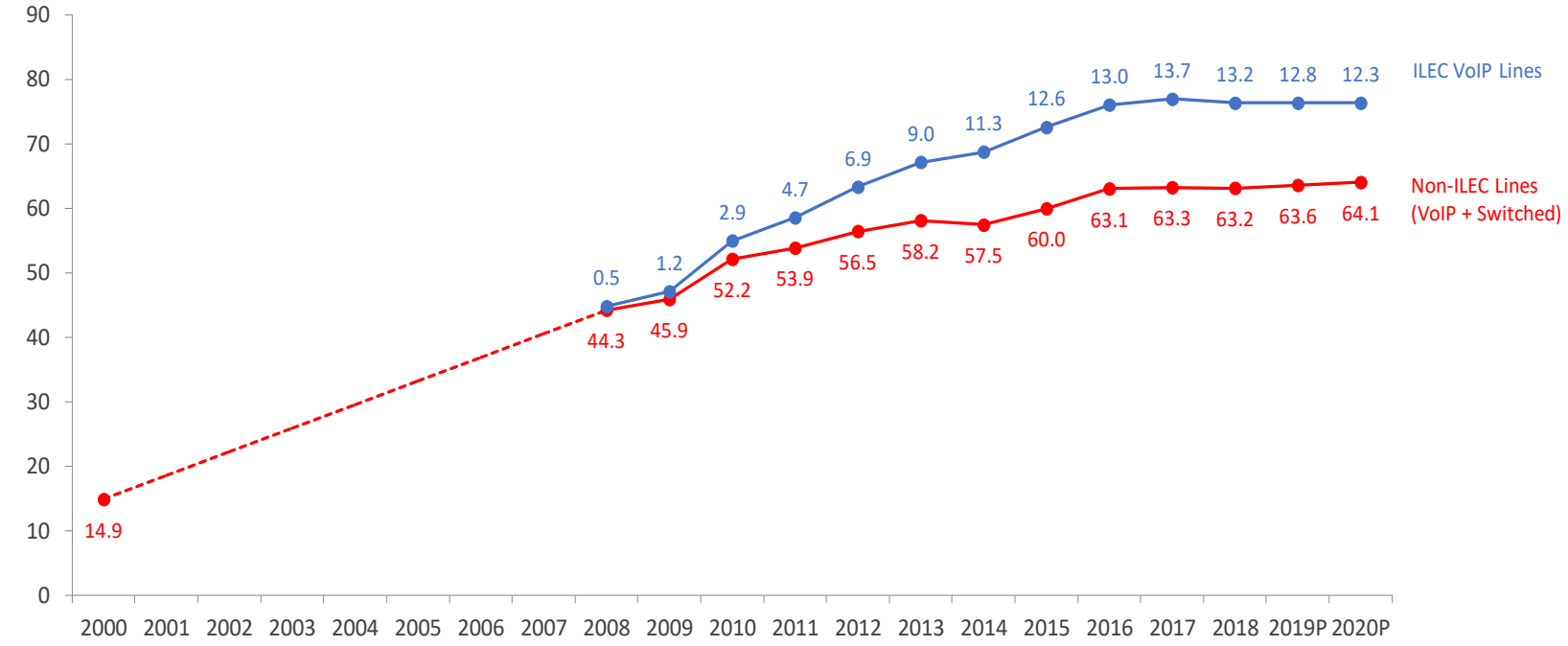
Source: FCC, Census, Bureau of Labor Statistics, USTelecom Analysis. Charts include mid-year voice and household data to match available jobs data.

Legacy Landline Voice Connections Are In Steep Decline



Source: FCC and USTelecom analysis. Includes primary and non-primary lines. Excludes ILEC VoIP and UNE-L (unbundled loops). Projections based on most recent 6-month straight-line run rates. Pre-2005, carriers with <10,000 lines did not report and FCC did not report residential lines.

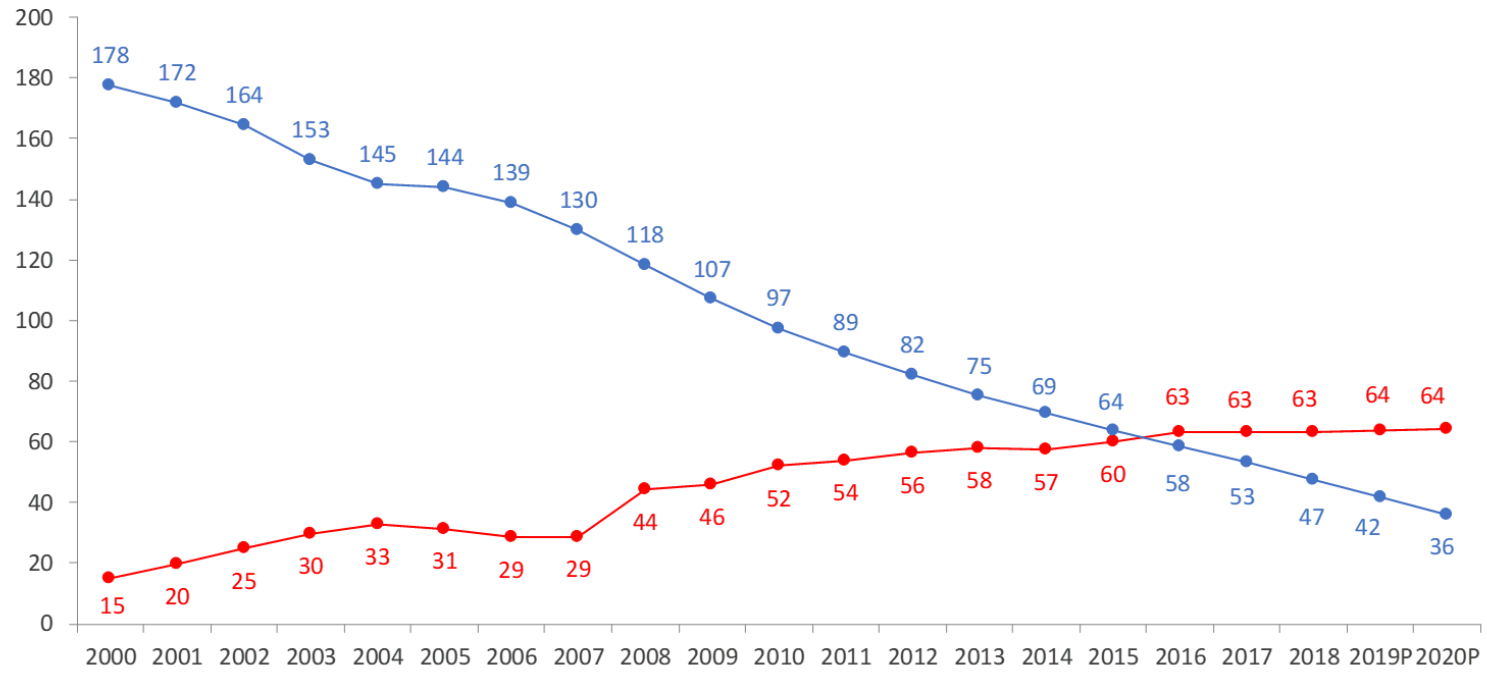
Wired Voice Customers Are Leaving Legacy Landlines for Competitive and Internet-Based Alternatives



Source: FCC and USTelecom analysis. Includes primary and non-primary lines. Includes non-ILEC lines using ILEC wholelsale lines. Pre-2005, carriers with <10,000 lines did not report and FCC did not report residential lines. Projections are straight-line based on most recent 6-month trend. Pre-2008 Non-ILEC data excluded due to data reliability issues.

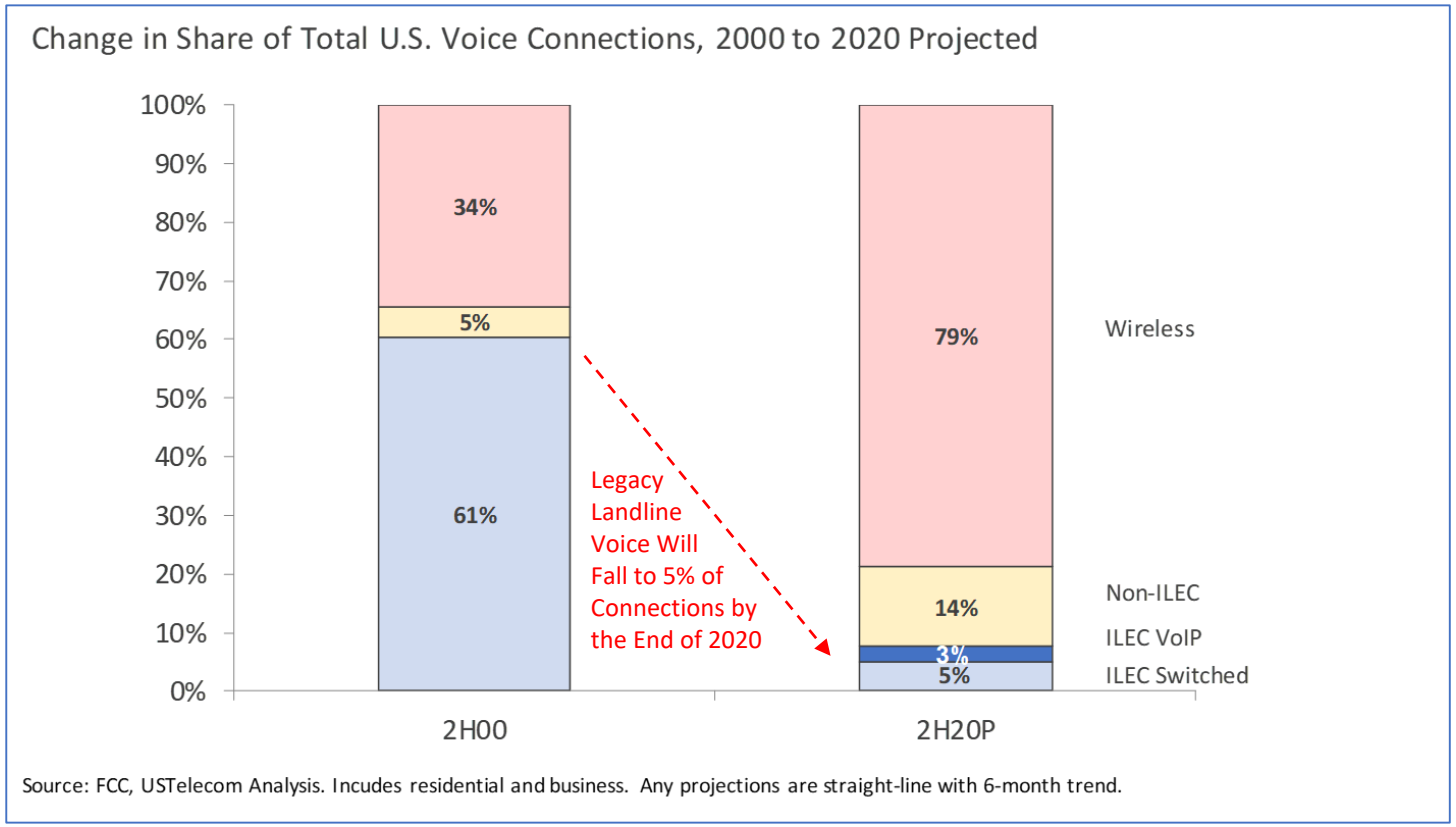
Non-ILECs Surpassed ILECs in Wired Voice Nearly Five Years Ago

ILEC and Non-ILEC Retail Switched and VoIP Lines 2000 – 2020 Projected (millions)

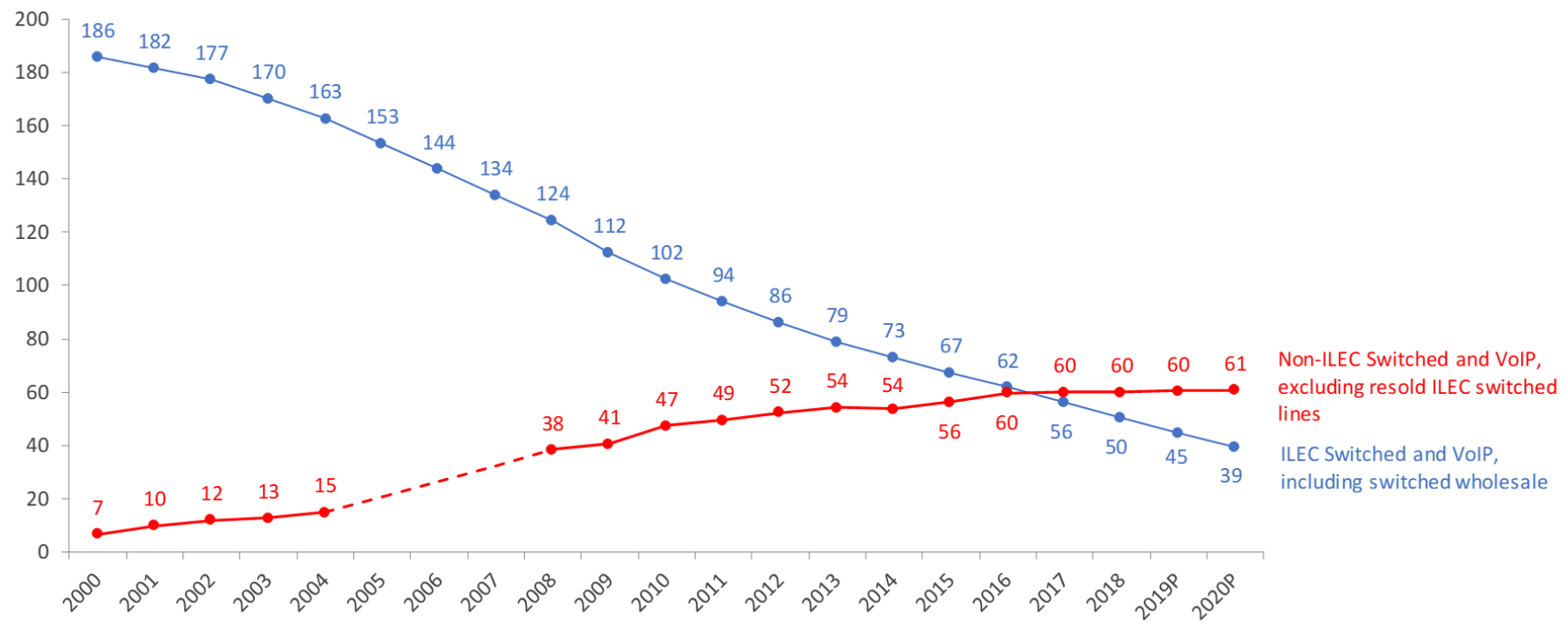


Source: FCC and USTelecom analysis. Pre-2005, carriers with <10,000 lines did not report. Pre-2008 data exclude VoIP. ILEC lines exclude wholesale. Projections are straight-line based on most recent 6-month trend.

Nearly Four-Fifths of U.S. Voice Connections Are Wireless

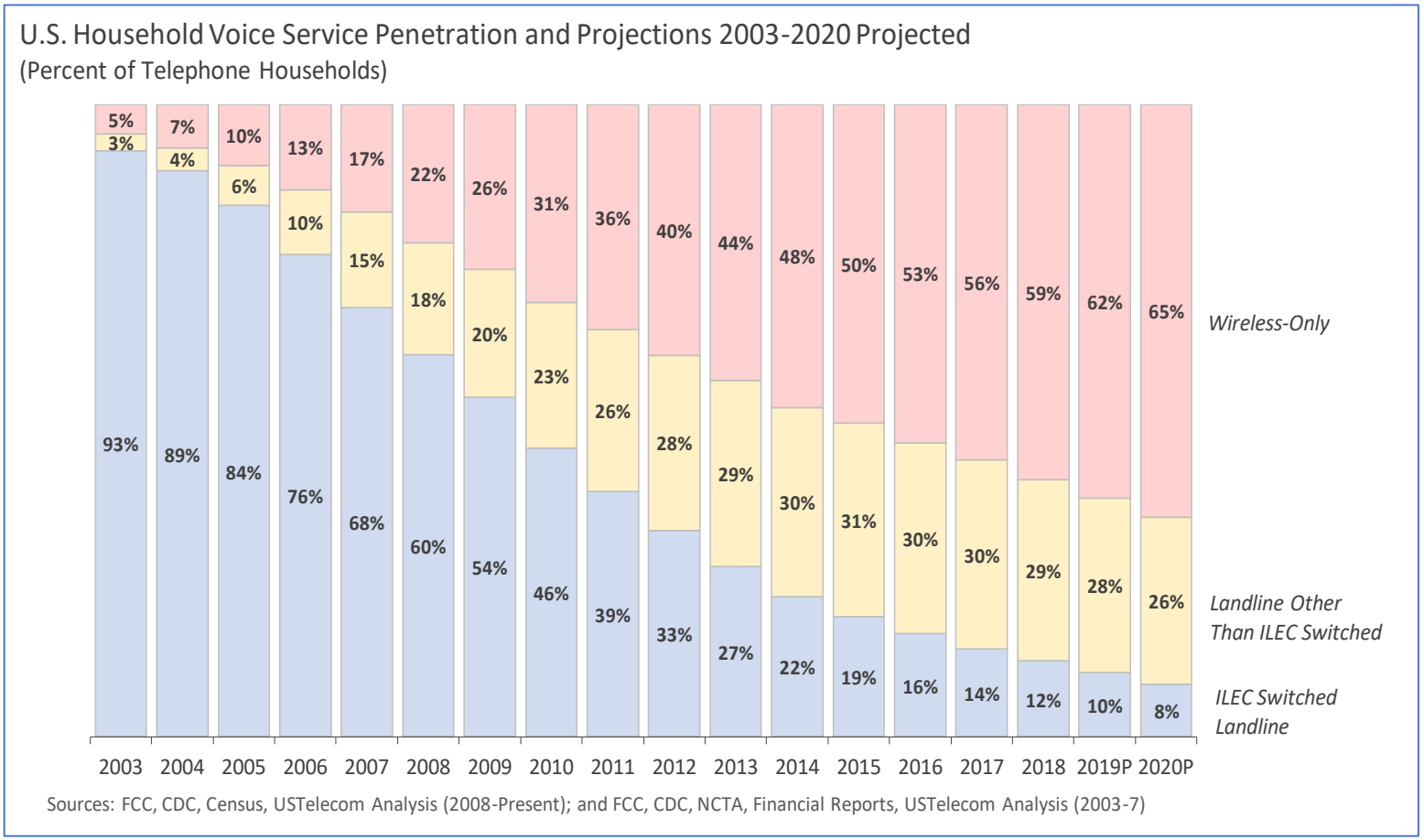


Non-ILECs Have Surpassed ILECs in Wired Voice
Even When Attributing Wholesale Lines to the ILEC



Source: FCC and USTelecom analysis. Pre-2005, carriers with <10,000 lines did not report. Pre-2008 data exclude VoIP. ILEC lines exclude wholesale. 2005-7 Non-ILEC data excluded due to data reliability issues. Projections are straight-line based on most recent 6-month trend.

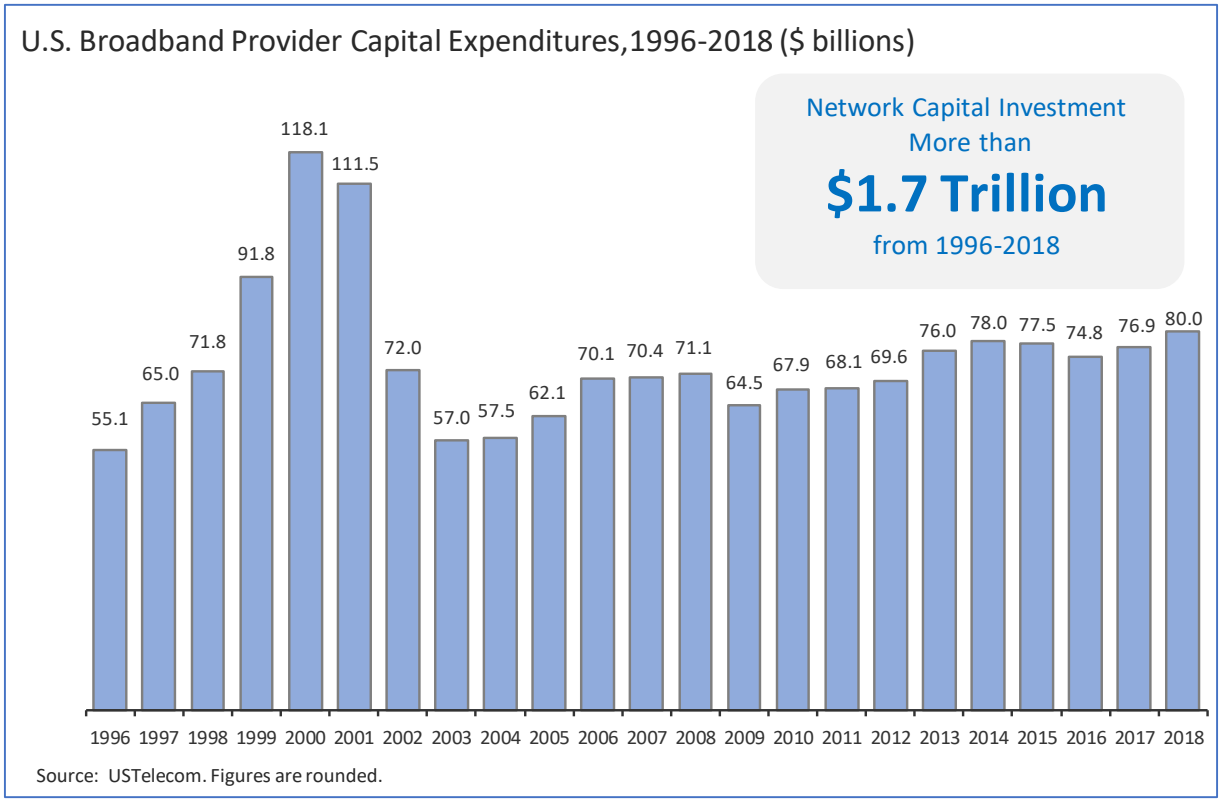
The Vast Majority of U.S. Households Have Moved from Legacy Landlines to Wireless or IP Voice



2. Investment Drives Broadband Deployment, Adoption, and Innovation

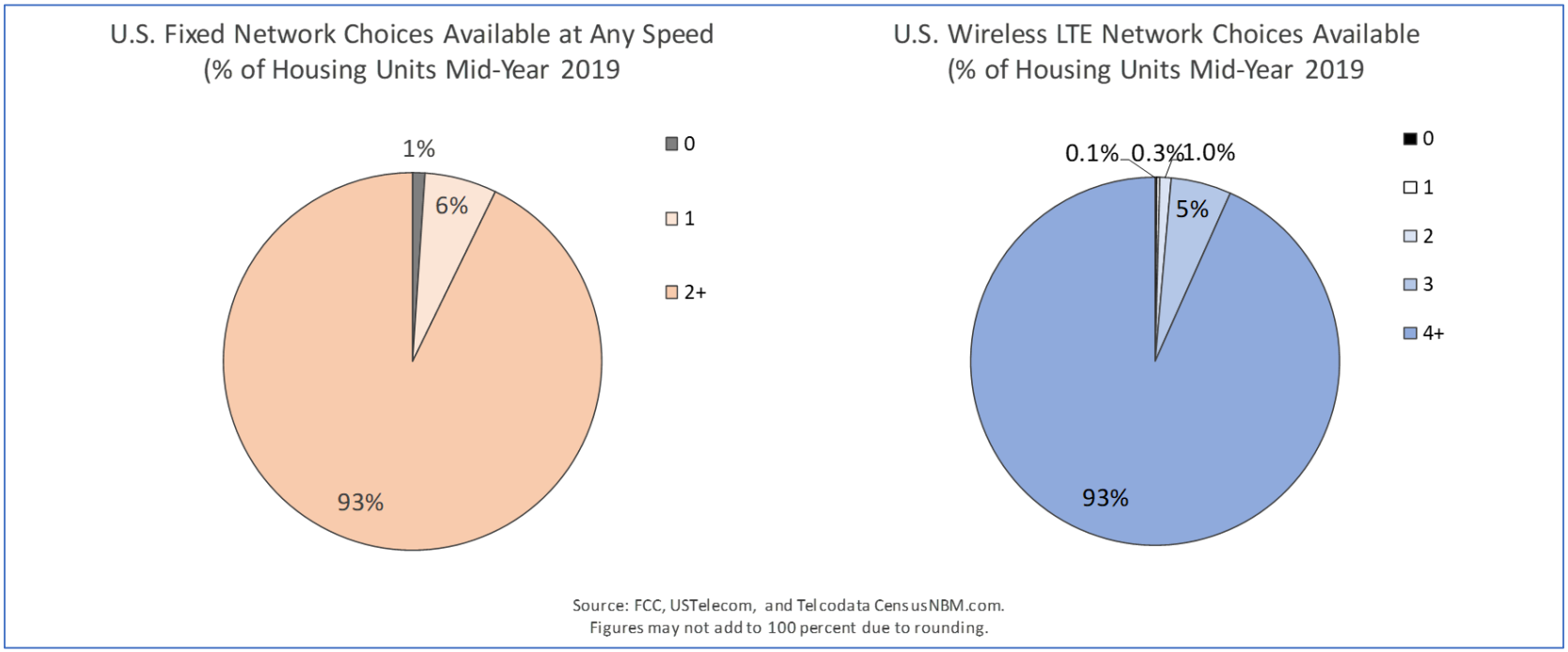
A light-touch regulatory policy environment, along with targeted government financial support, for broadband has encouraged trillions of dollars in investment, leading to near-nationwide deployment, widespread adoption of innovative services, and significant progress in narrowing the digital divide

Broadband Providers Have Invested More Than $1.7 Trillion in Capital since 1996



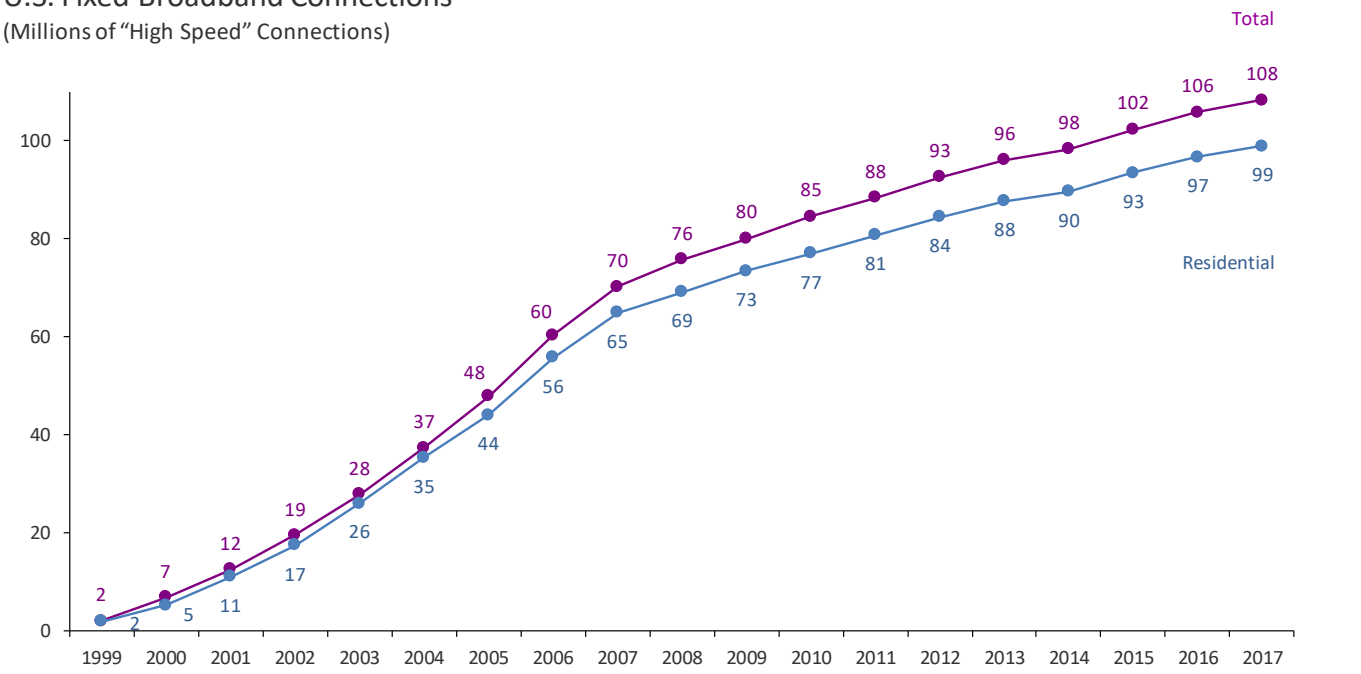
Data includes wireline, wireless, and cable providers.

Network Investment by Competitive Providers Has Brought Near-Nationwide Deployment



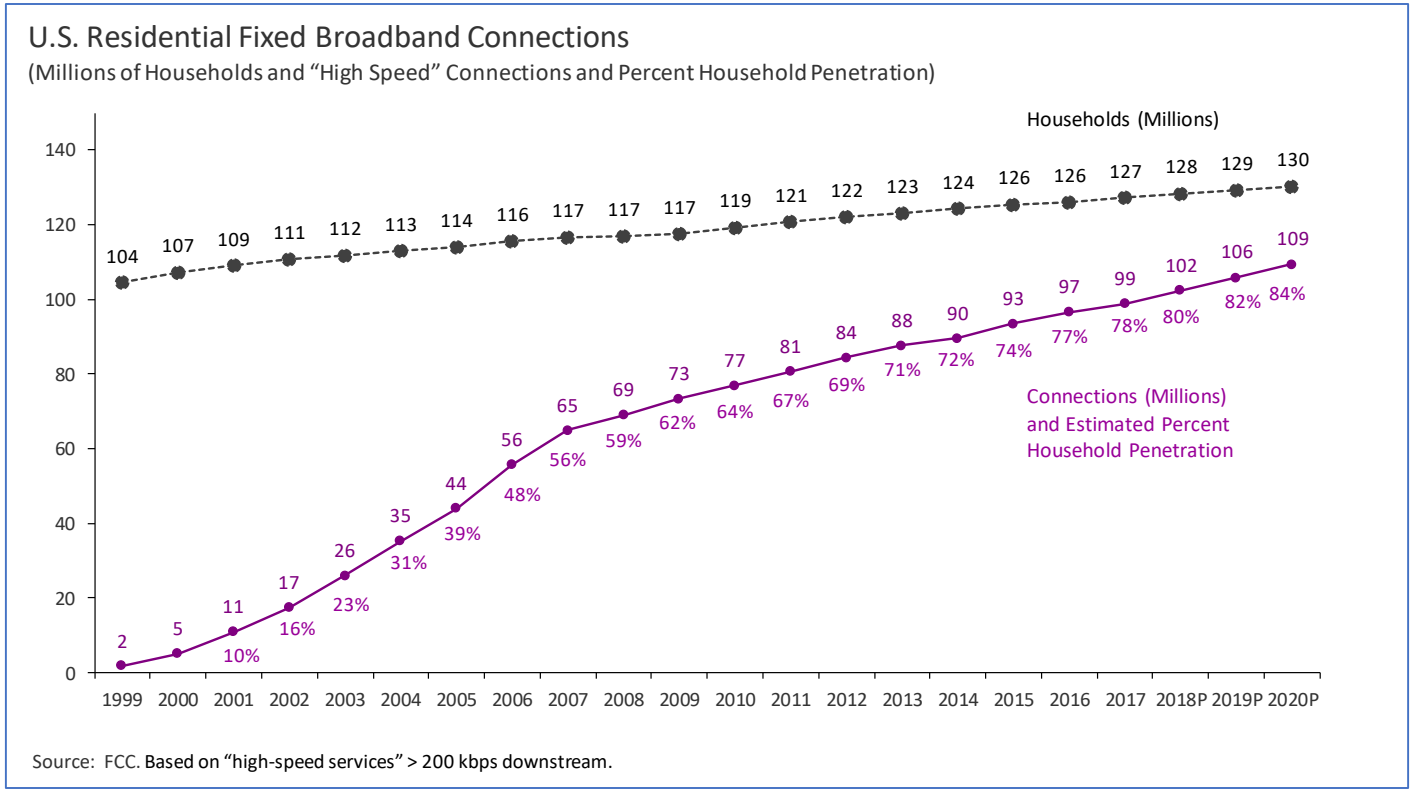
Fixed broadband includes wired broadband and fixed wireless services, but excludes satellite. Wired broadband, excluding fixed wireless, is shown on page 21.

Investment Has Enabled Widespread and Ongoing Broadband Adoption



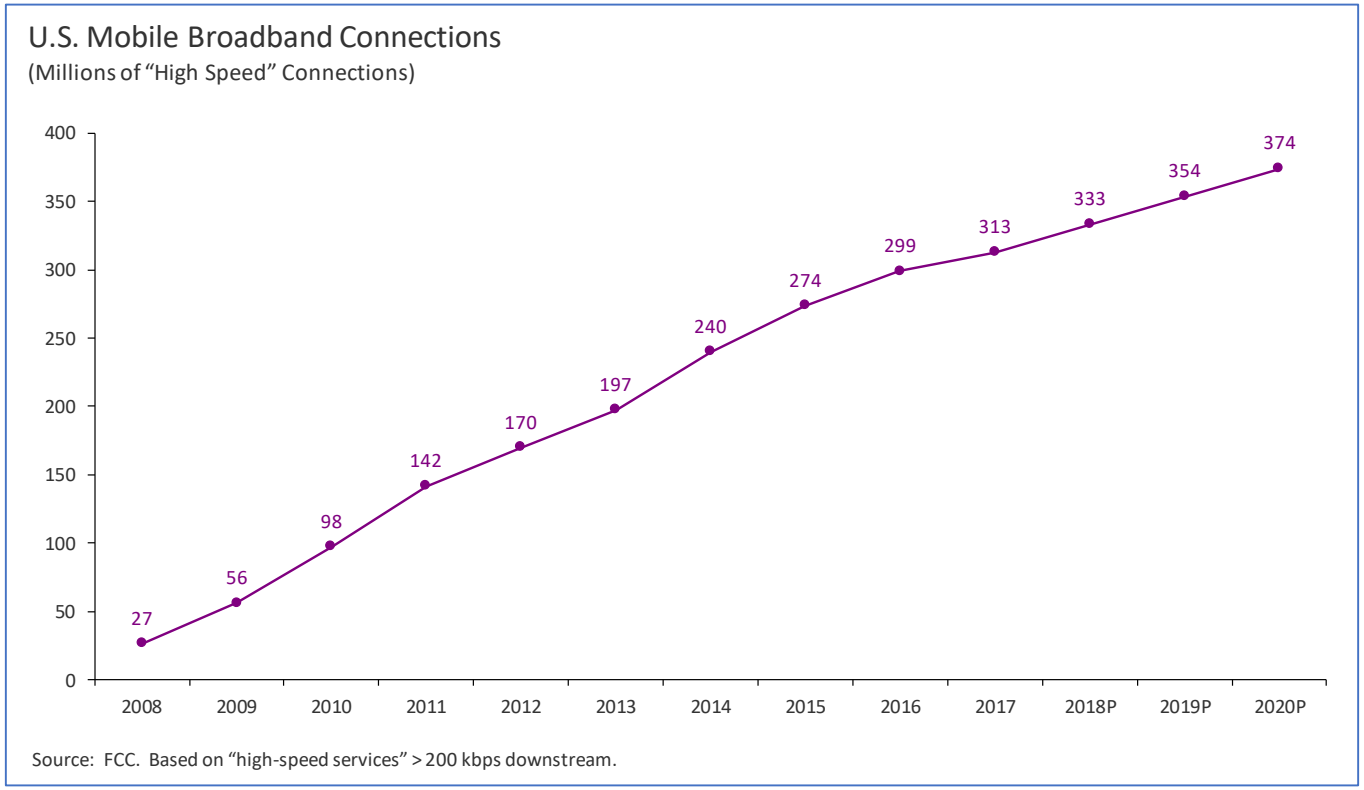
Source: FCC. Based on "high-speed services" > 200 kbps downstream. Today, providers have deployed higher speeds to the vast majority of the nation and most consumers have migrated to higher speeds multiple times over the years. This series includes all dedicated Internet access connections to track the growth of connectivity generally over time. The FCC publishes data tracking deployment and connections by speed.

Fixed Broadband Is Still Outpacing Household Growth and Approaching 85 Percent Penetration



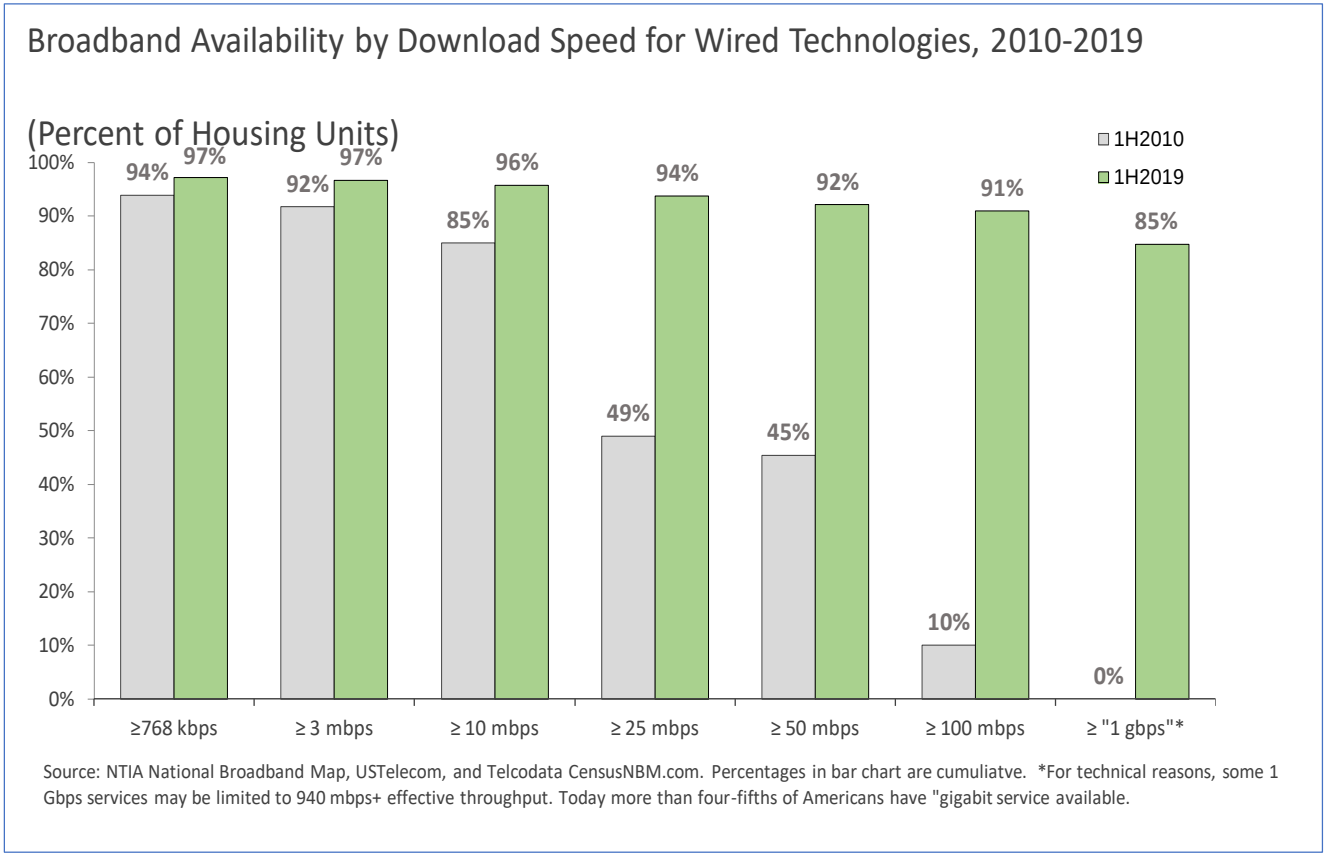
Source: FCC. Based on "high-speed services" > 200 kbps downstream.

Mobile Broadband is Growing Rapidly



U.S. smartphone adoption estimates range from 81% of adults (Pew Internet, June 2019) to 83% of households (Consumer Technology Association, First Quarter 2019)

Providers Are Deploying Networks Capable of Providing Higher Speeds

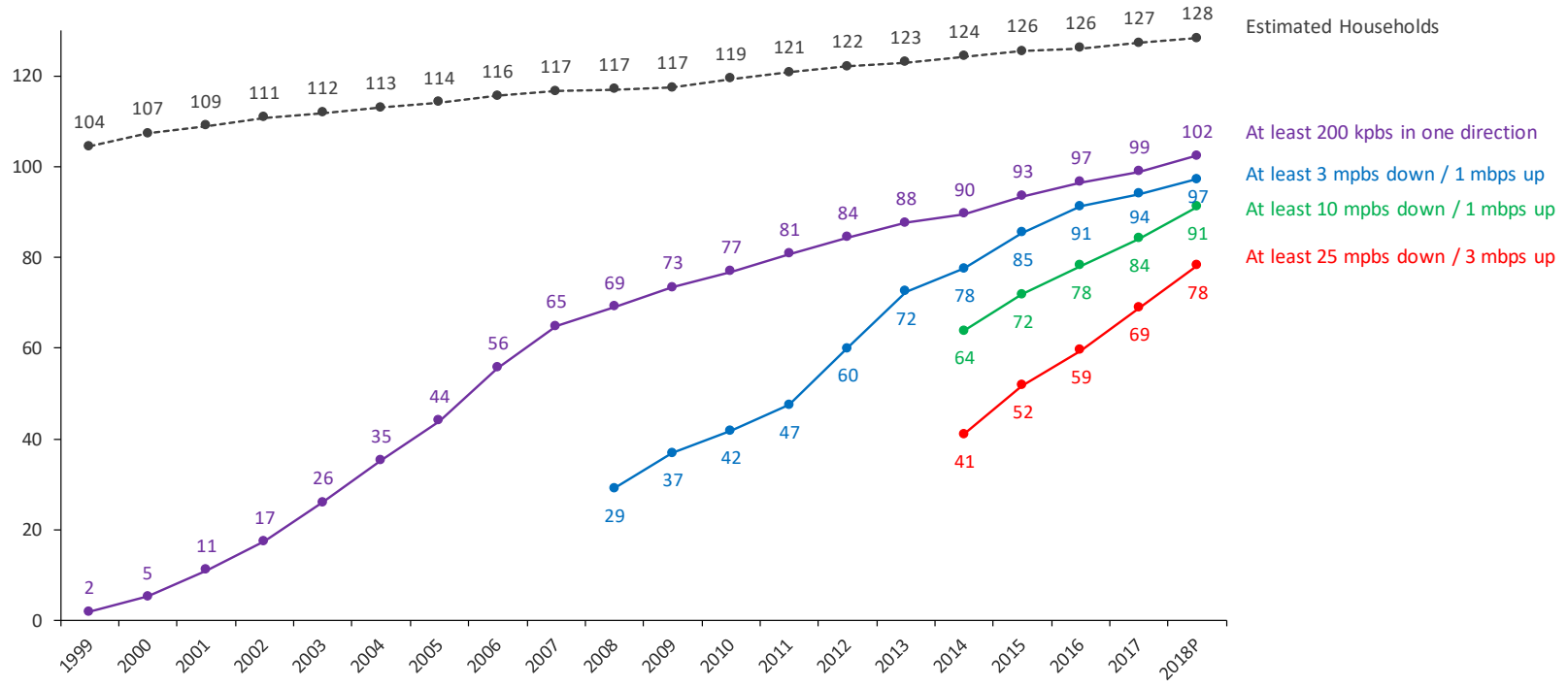


Source: NTIA National Broadband Map, USTelecom, and Telcodata CensusNBM.com. Percentages in bar chart are cumuliatve. *For technical reasons, some 1 Gbps services may be limited to 940 mbps+ effective throughput. Today more than four-fifths of Americans have "gigabit service available.

In addition to wired broadband, 4G mobile broadband grew from availability of less than 1% of Americans in 2010 to 99.8% in 2018. 4G Download speeds are in excess of 20 Mbps (opensignal.com) and 5G deployment is underway

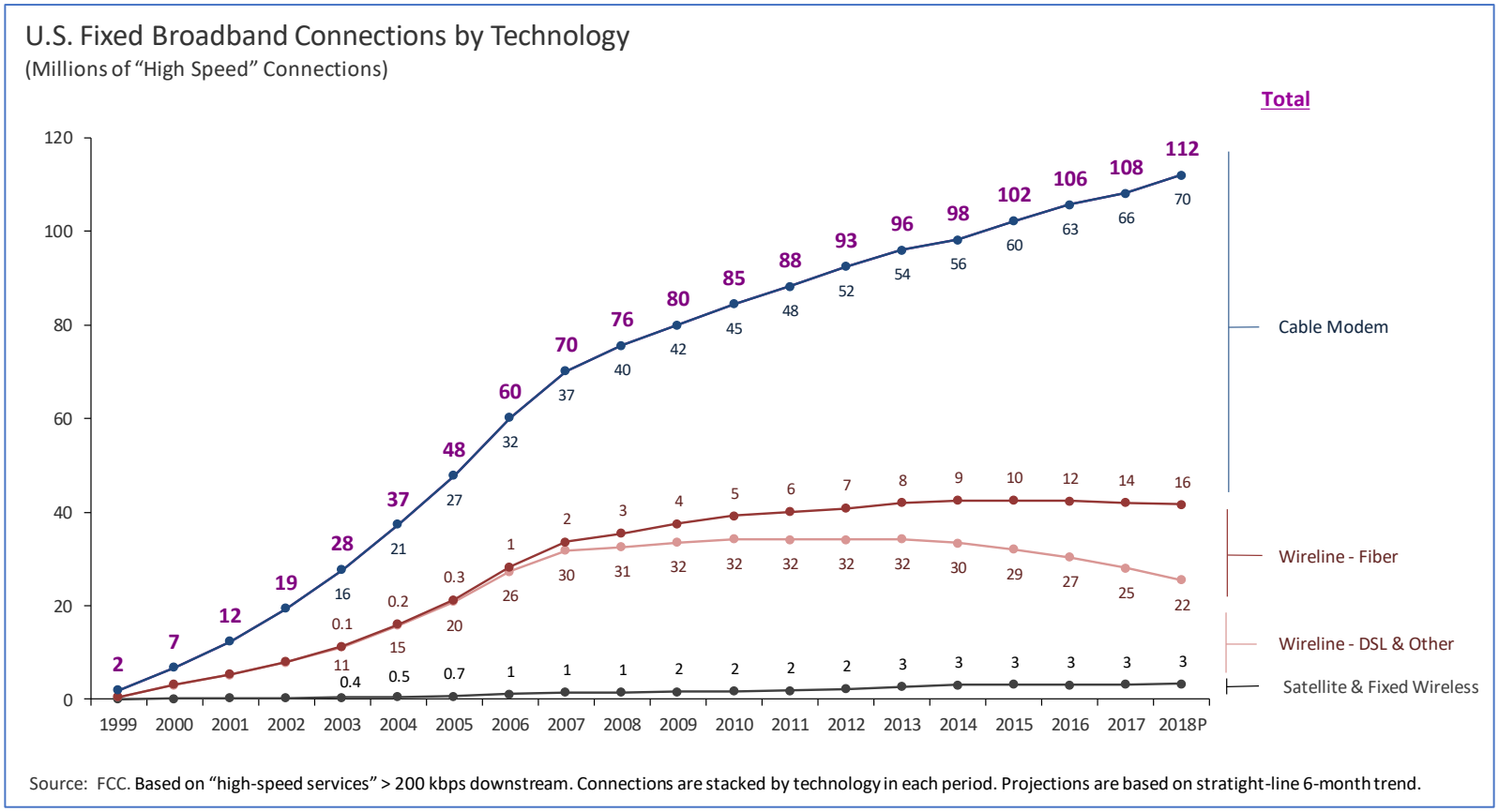
Consumer Are Choosing Services with Higher Speeds

U.S. Residential Fixed Broadband Connections by Speed and Households
(Millions of Connections)



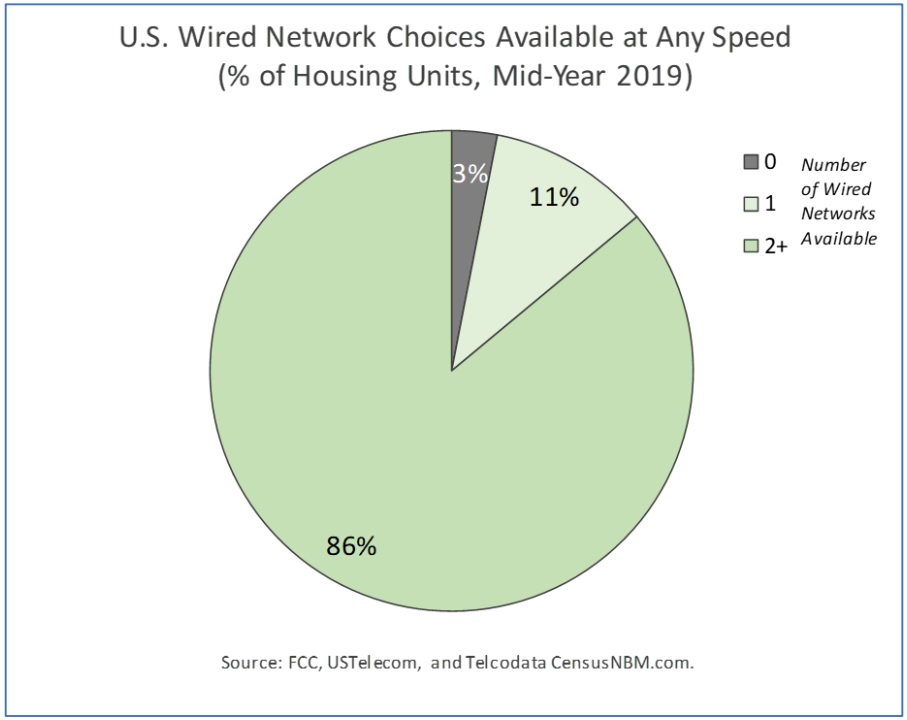
Source: FCC, Census, USTelecom. "At least" lower-speed categories are inclusive of higher-speed categories. Projections are straight-line based on most recent 6-month trend.

Broadband Has Been a Competitive Industry from Its Inception



Source: FCC. Based on "high-speed services" > 200 kbps downstream. Connections are stacked by technology in each period. Projections are based on stratight-line 6-month trend.

Competitive Network Infrastructure Is Widely Available



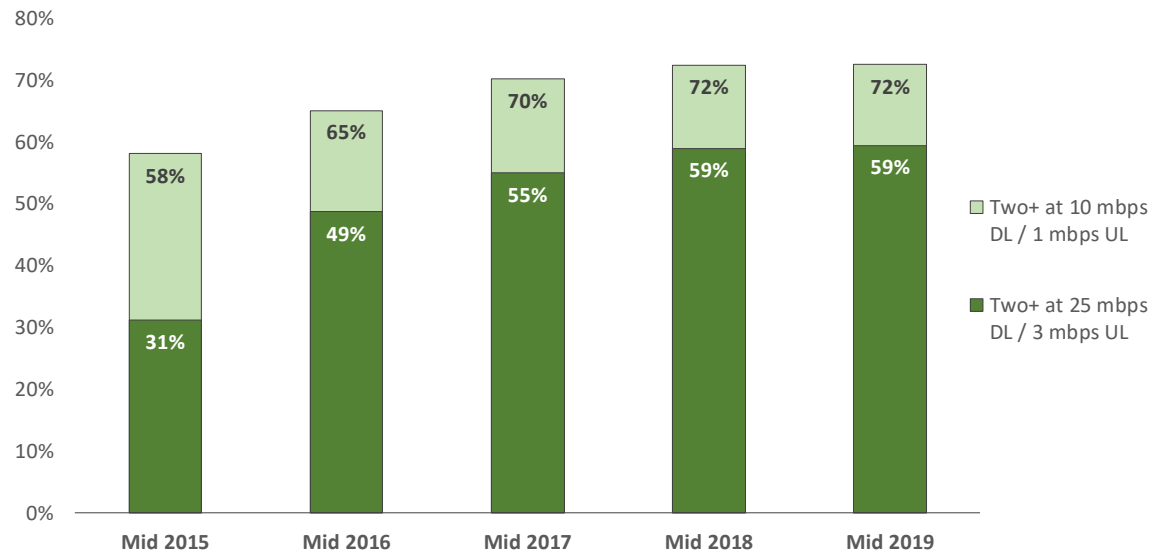
This chart focuses narrowly on wired broadband competition for comparison with historical wired broadband data on page 22. Fixed broadband, which includes fixed wireless services, is shown on page 14 and has even greater competitive overlap among technologies.

Competition at Higher Speed Tiers Is Continually Growing As Providers Invest in Network Upgrades

U.S. Broadband Competition: Services Deployed Widely and Speeds Growing Rapidly

(% of U.S. Housing Units with Two or More Wired Broadband Options Available at Selected Speed Tiers, 2015 to 2019)

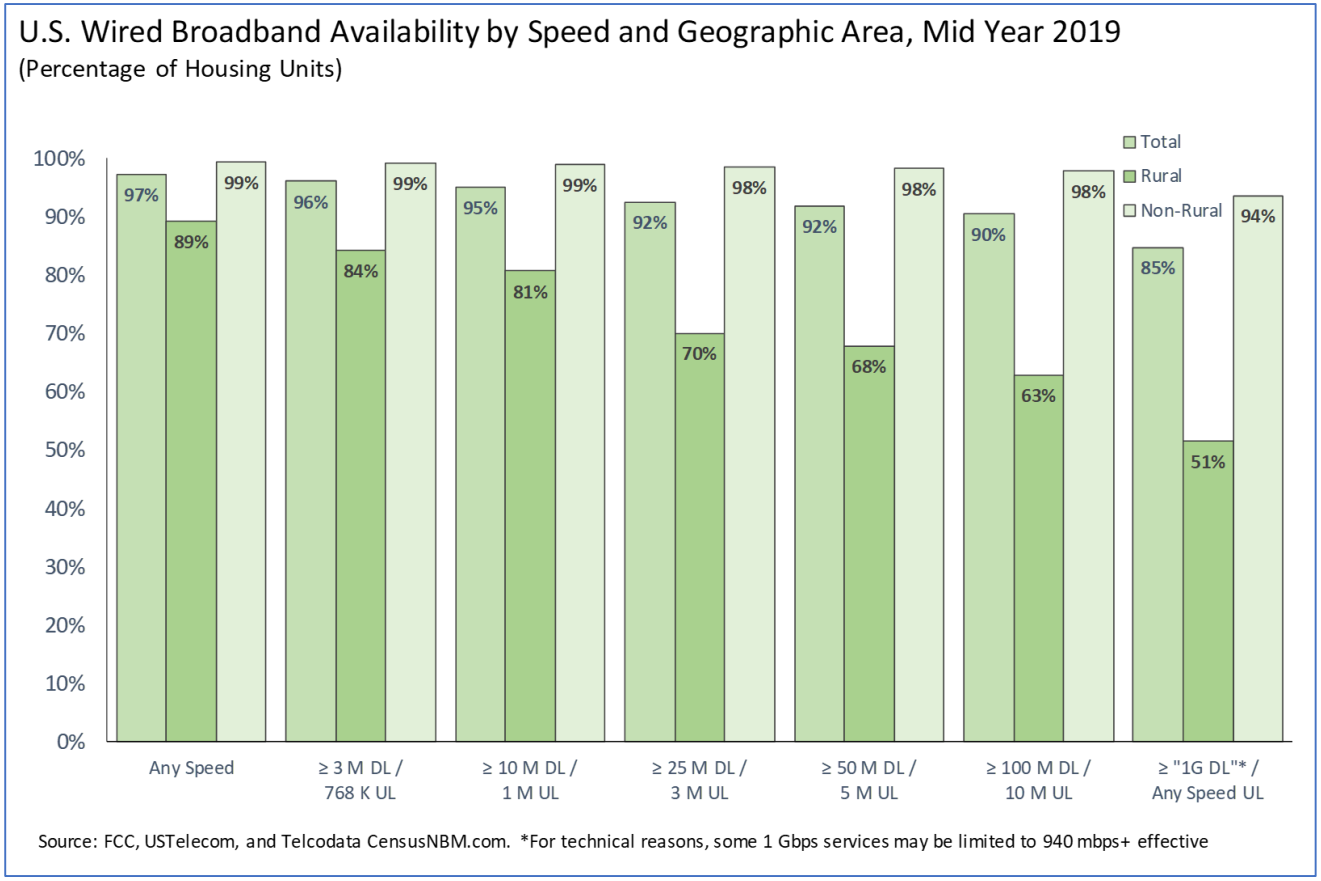
Two or more wired broadband providers are available to 86 percent of Americans and at least one option is available to 97 percent. Competition occurs dynamically over time as providers upgrade network speed and quality. In addition to wired options from telecom, cable, and others, multiple satellite and wireless options are available to nearly all Americans.



Sources: FCC, USTelecom, and Telcodata CensusNBM.com.

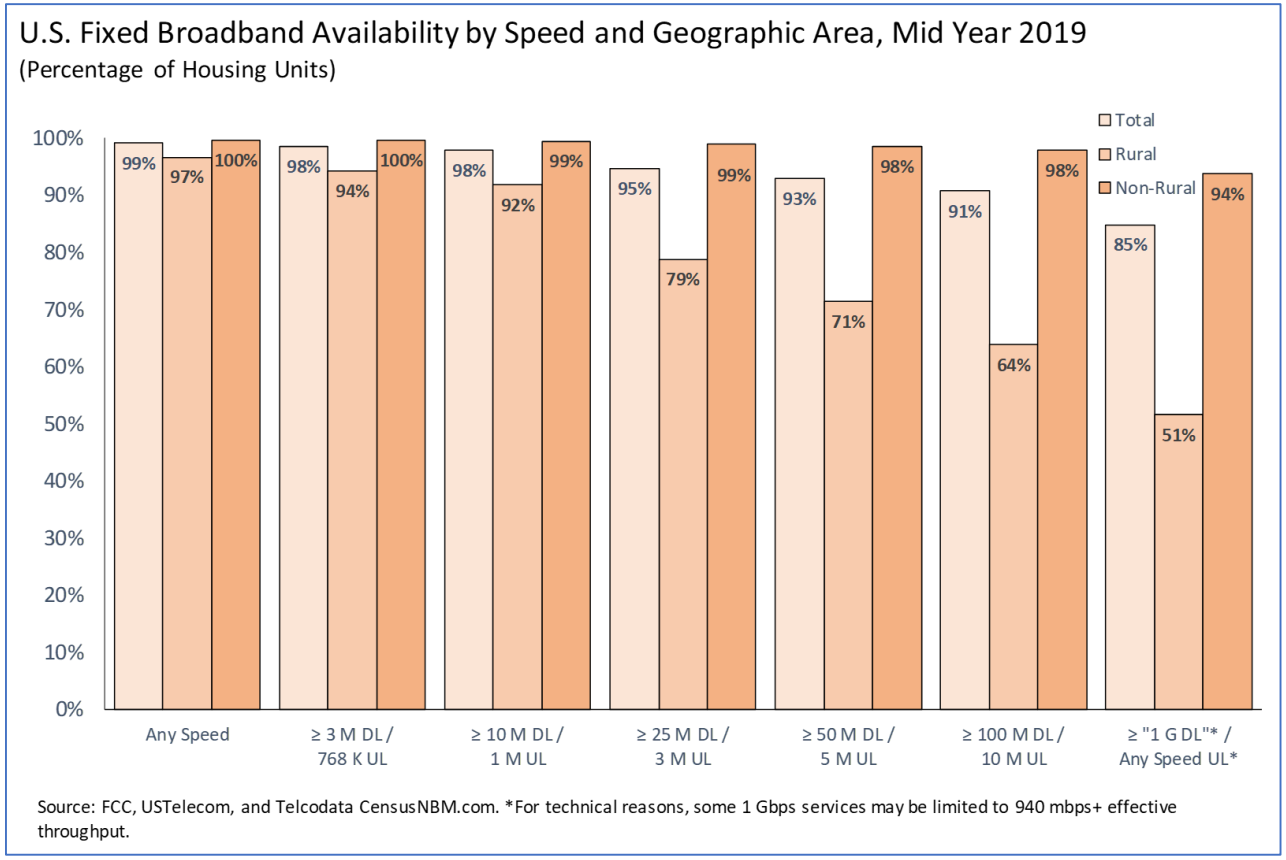
This chart focuses narrowly on wired broadband competition due to historical data limitations. Fixed broadband, which includes fixed wireless services, would show even greater competitive overlap.

Broadband Gaps Remain in High-Cost Rural Areas



USTelecom supports direct, non-duplicative government support to broadband providers as the most economically and administratively efficient way to close broadband gaps

Fixed Wireless Eliminates Some Rural Coverage Gaps



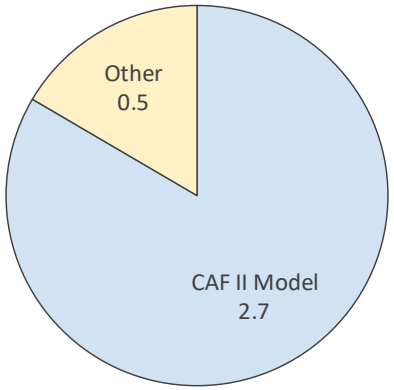
Source: FCC, USTelecom, and Telcodata CensusNBM.com. *For technical reasons, some 1 Gbps services may be limited to 940 mbps+ effective throughput.

These data include fixed terrestrial wireless

USTelecom supports flexible, cost-effective policies that do not impose rigid technology and speed requirements

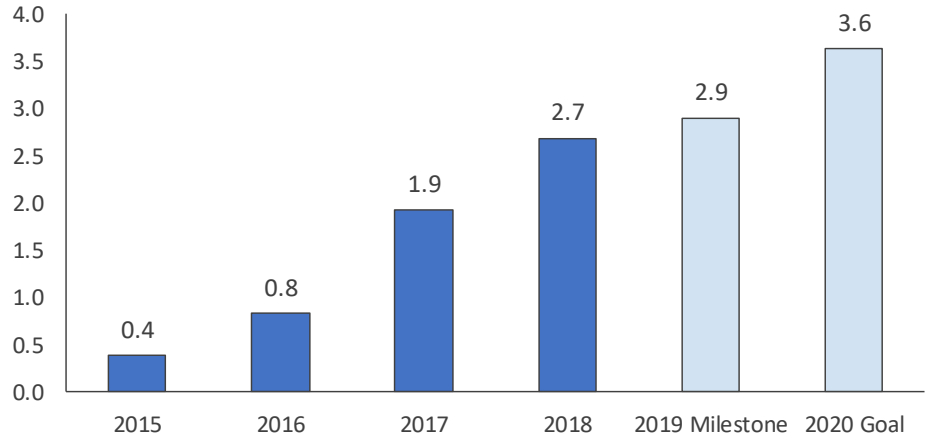
Federal Universal Service Programs Are Connecting Millions of Rural Americans to Broadband

Locations Served with High Cost Support at End of 2018
(Millions)



3.2 million total

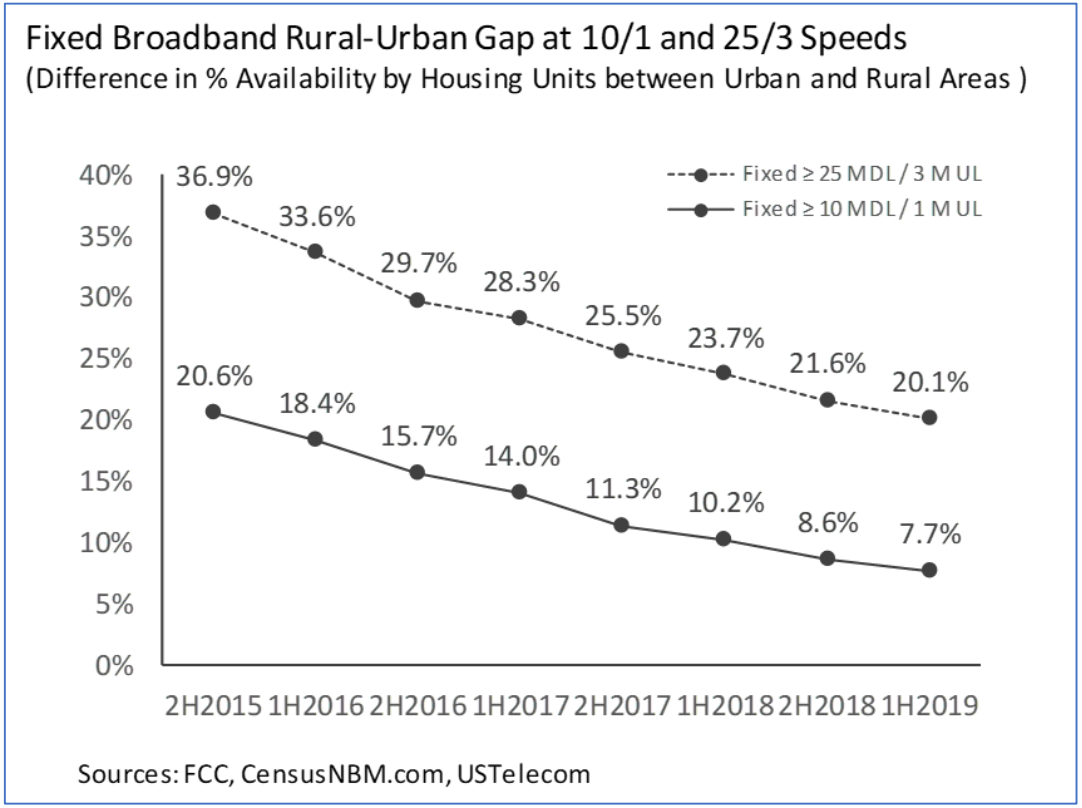
Cumulative Locations Served with CAF II Model Support 2015-2020
(Millions)



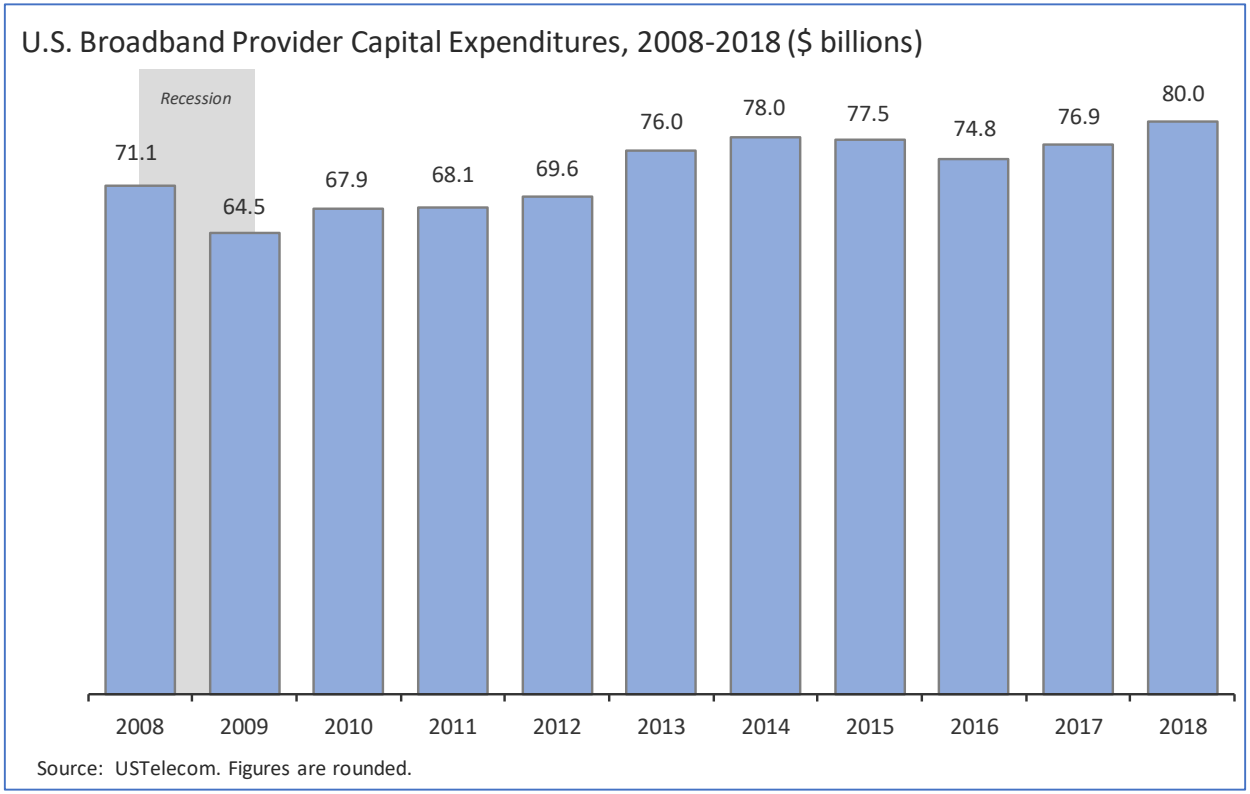
Source: Universal Service Administrative Company

The federal high cost program was $4.684b in 2018 compared to $4.673b in 2017. Many states have universal service programs that supplement federal funding. According to the National Regulatory Research Institute, in 2017 there were 22 states with high cost funds ($451m) and 8 with broadband funds ($122m).

Rural Broadband Gaps Are Narrowing Due to Private Investment and Government Support



Broadband Capex Fell in 2015 and Resumed Growth in 2017 with Return to Light Touch Regulation

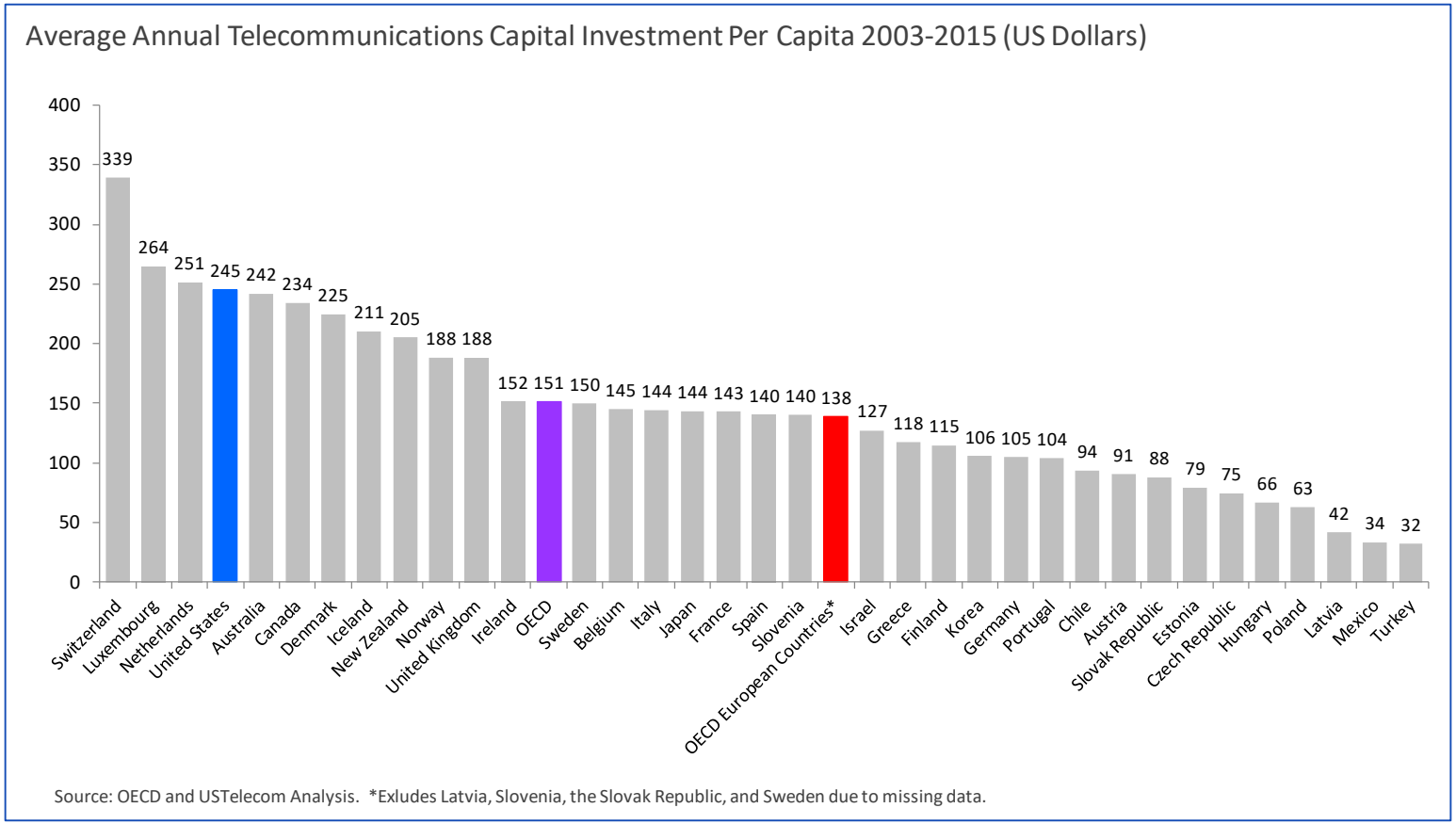


Addressing rural broadband gaps and maintaining international leadership will require increased broadband investment under an even-handed, light-touch regulatory framework

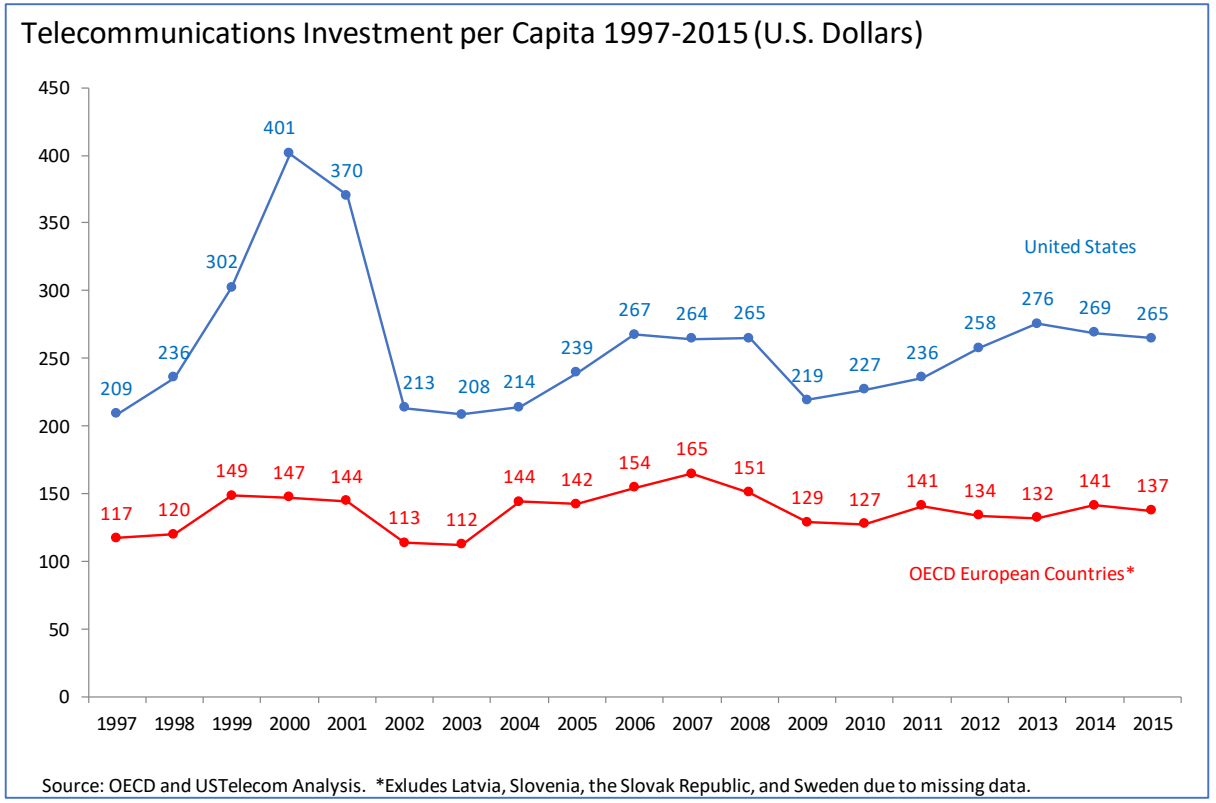
3. The U.S. Is a Global Leader as Internet Data Traffic Continues to Rise Rapidly

Accommodating data traffic growth and maintaining U.S. international leadership will require policies that address our greatest digital challenges while at the same time encouraging ongoing network investment, including the wireline infrastructure that is essential to next generation broadband and 5G wireless networks

U.S. Invests More in Broadband than Most Industrialized Nations

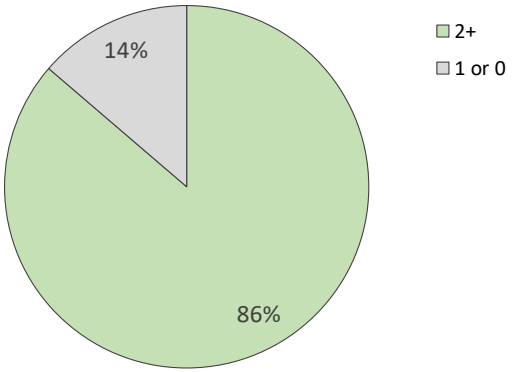


U.S. Invests More per Capita in Broadband than Europe



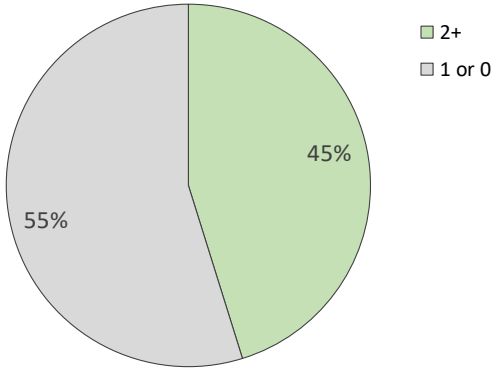
U.S. Investment in Facilities-Based Competition Has Yielded More Real Competitive Choice than Europe

U.S. Wired Network Choices
Facilities-Based Options Available at Any Speed
(% of Housing Units, Mid-Year 2018)



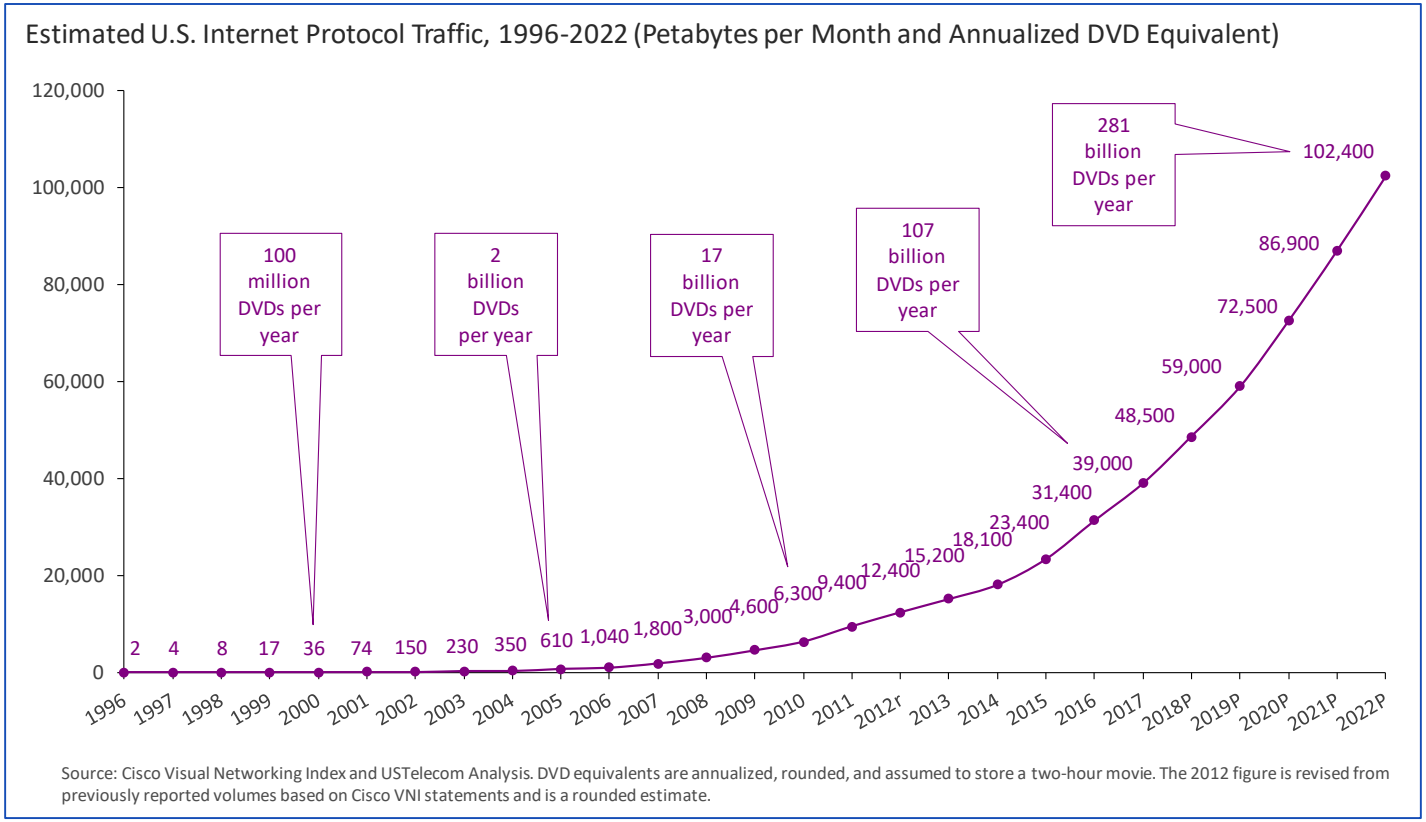
Source: FCC, USTelecom, and Telcodata CensusNBM.com.

EU28 Wired Network Choices
Facilities-Based Options Available at Any Speed
(% of Households, Mid-Year 2018)



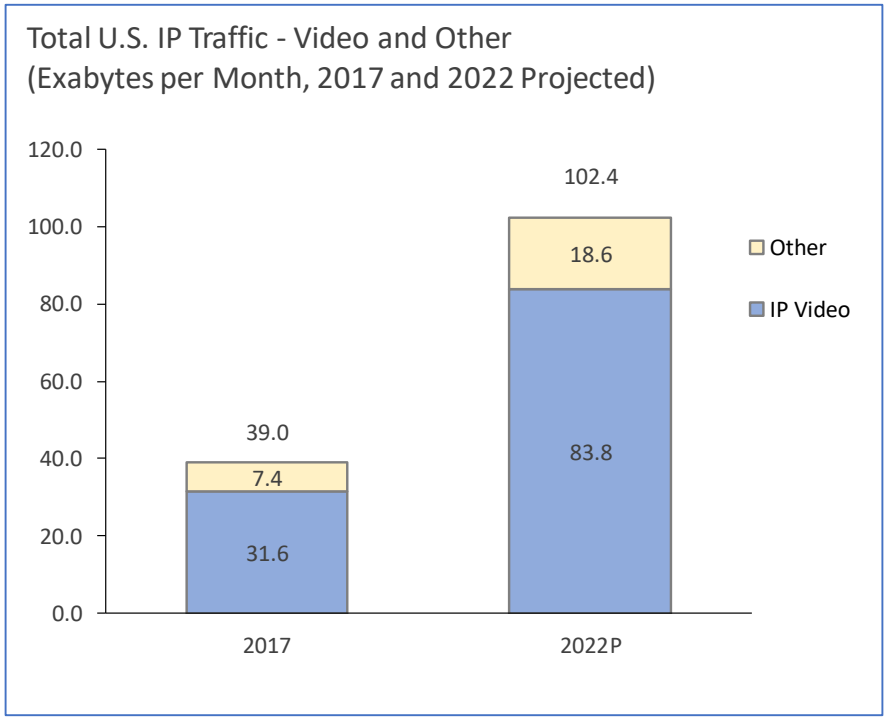
Source: European Union, USTelecom, and IHS Markit./Point Topic

Internet Protocol Traffic Continues Rapid Growth

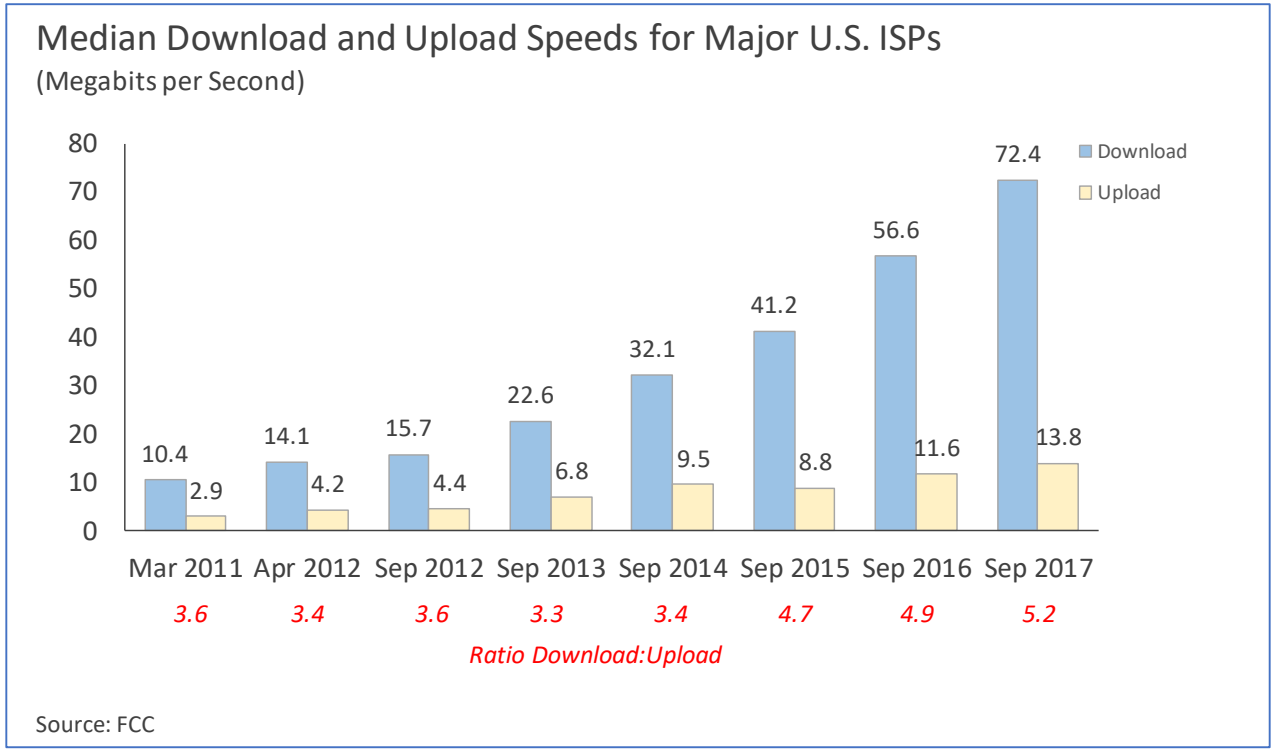


U.S. IP traffic is projected to grow 2.6x or an average annual growth rate of 21 percent in the next five years

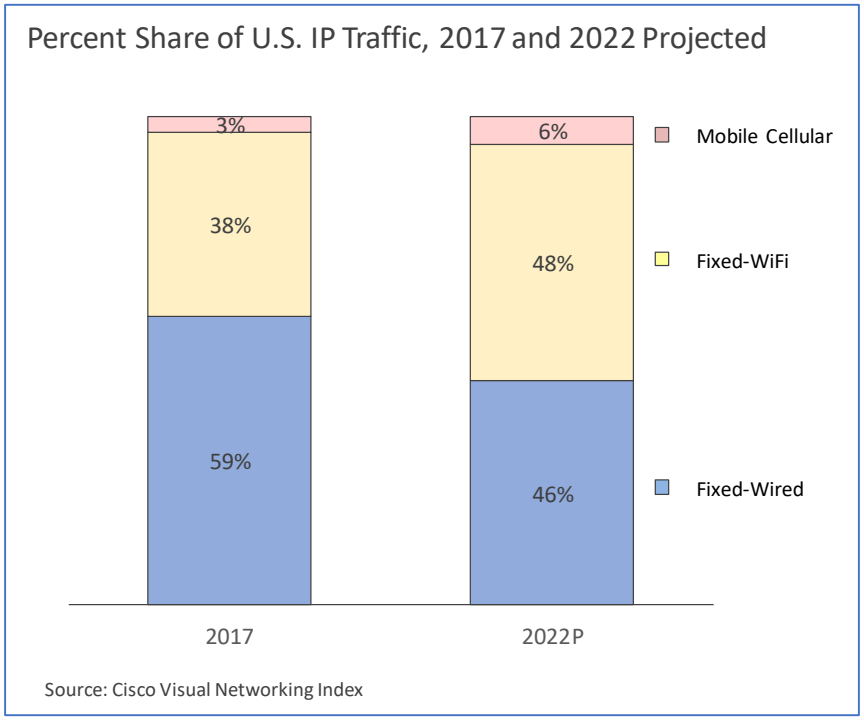
Video is the Largest Driver of IP Traffic



Downstream Traffic Represents a Large and Growing Share of Traffic

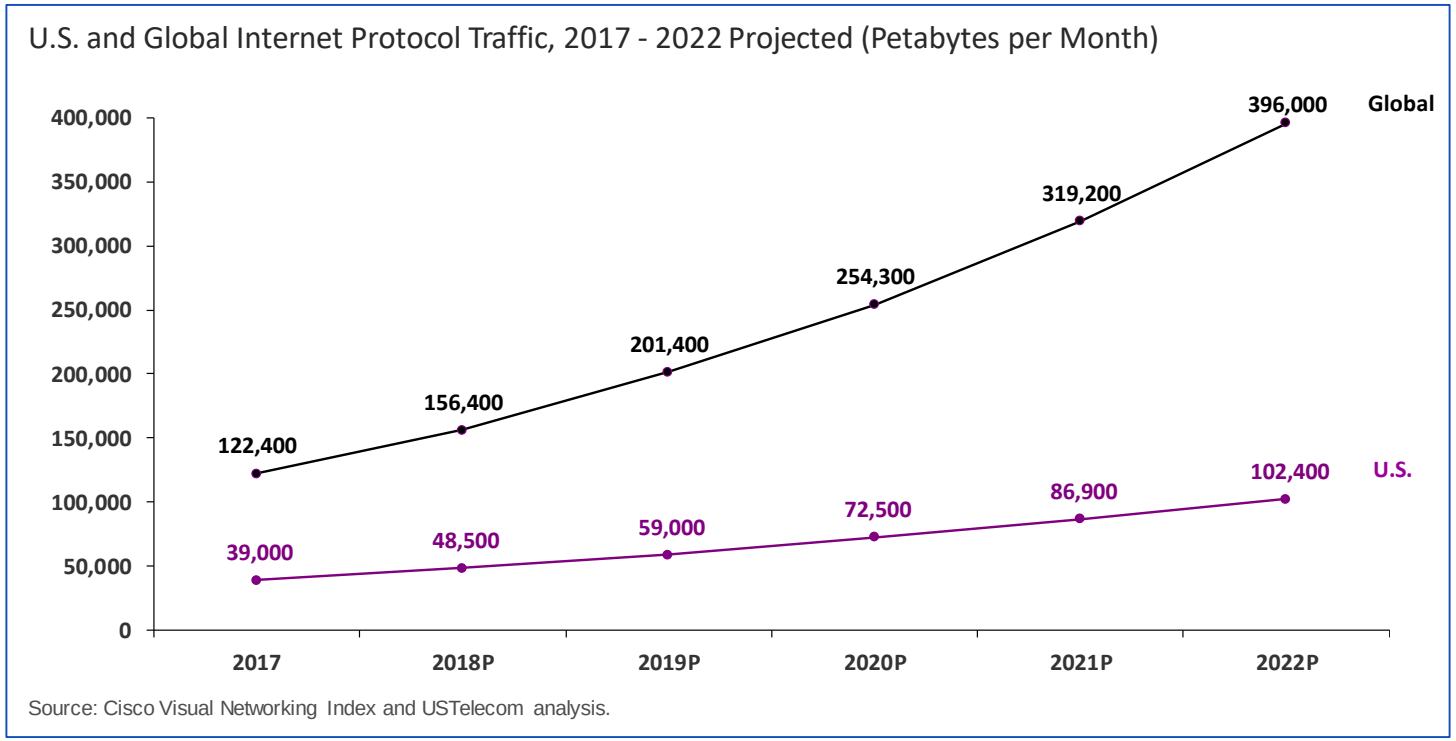


Mobile and Wi-Fi Are Growing but Fixed Networks Remain Essential for All Traffic



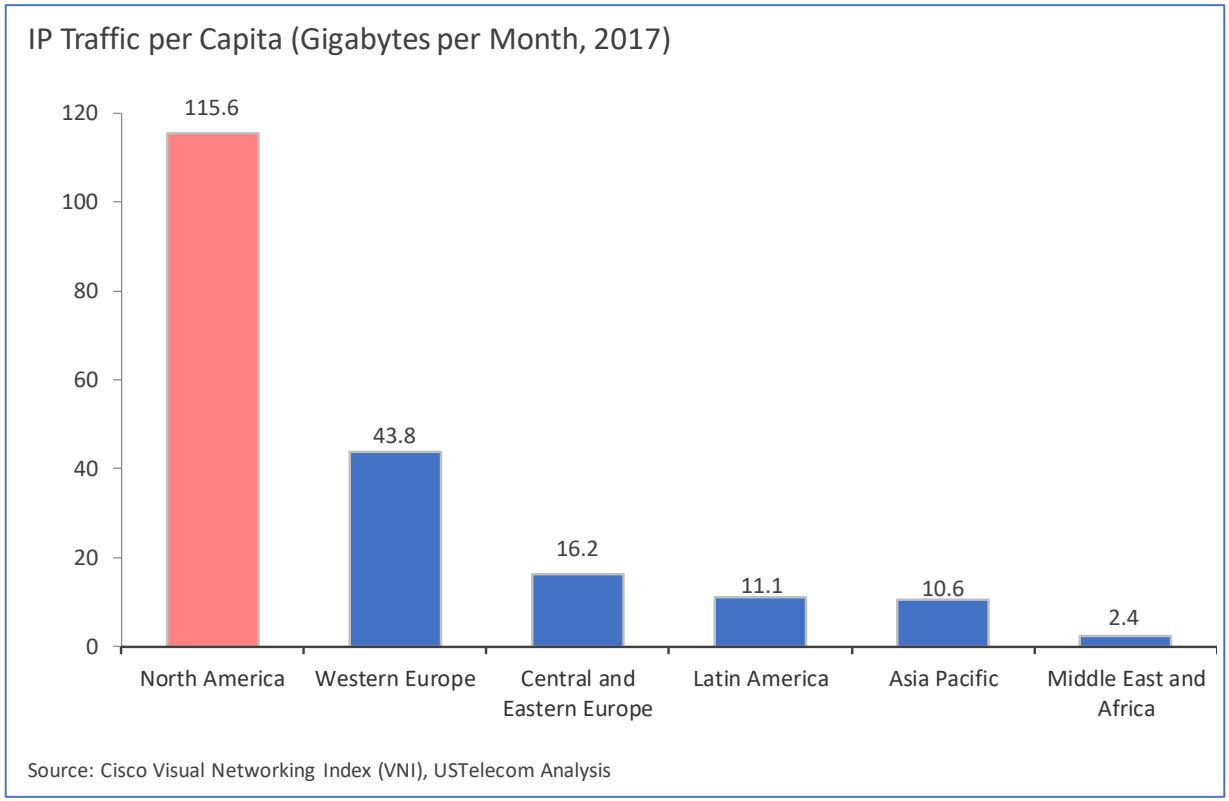
Wired networks are essential for nearly all traffic, including fixed and mobile, whether providing last mile access, backhaul for mobile cell sites or fixed wireless equipment, metro and backbone transport, or connectivity to data centers and content distribution networks; and Wi-Fi is merely a short-range extension of a fixed network

The U.S. Is a Global Leader in IP Traffic

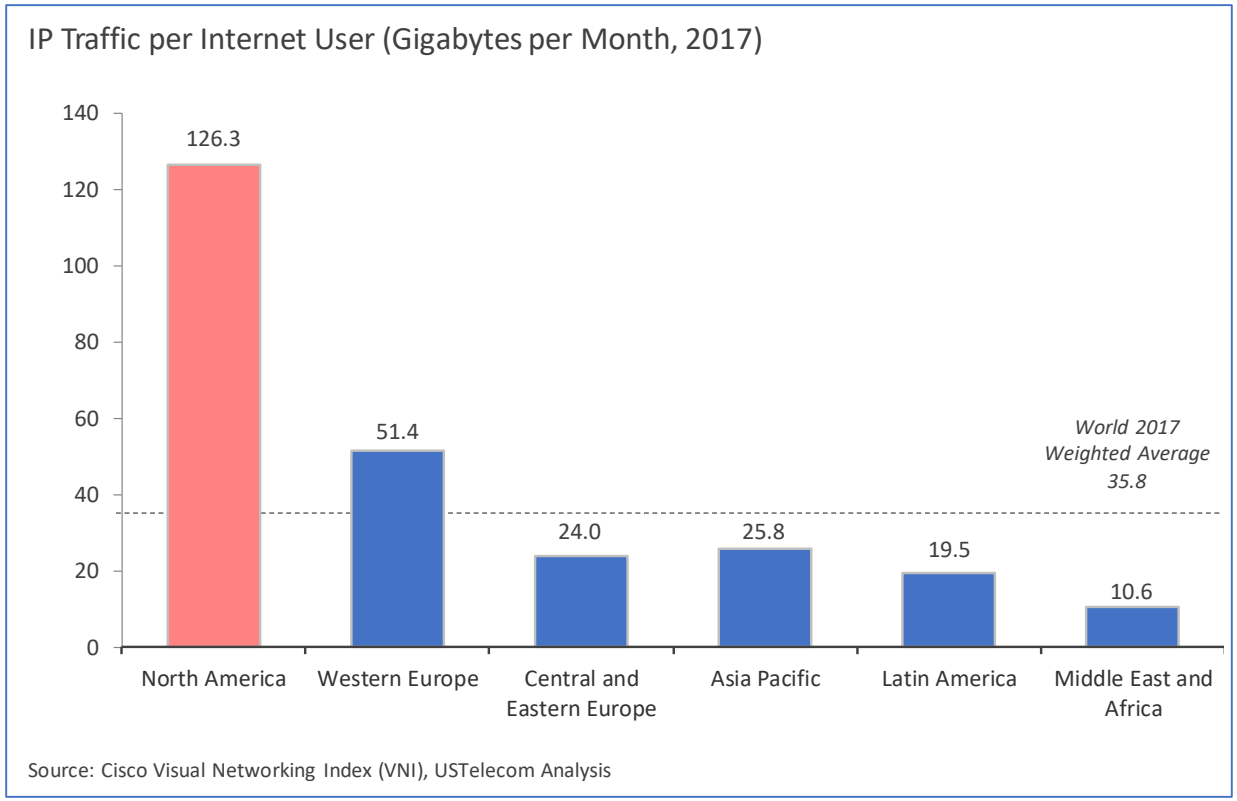


The U.S. is home to 4.3% of the world's population, but it generates nearly one-third of global IP traffic

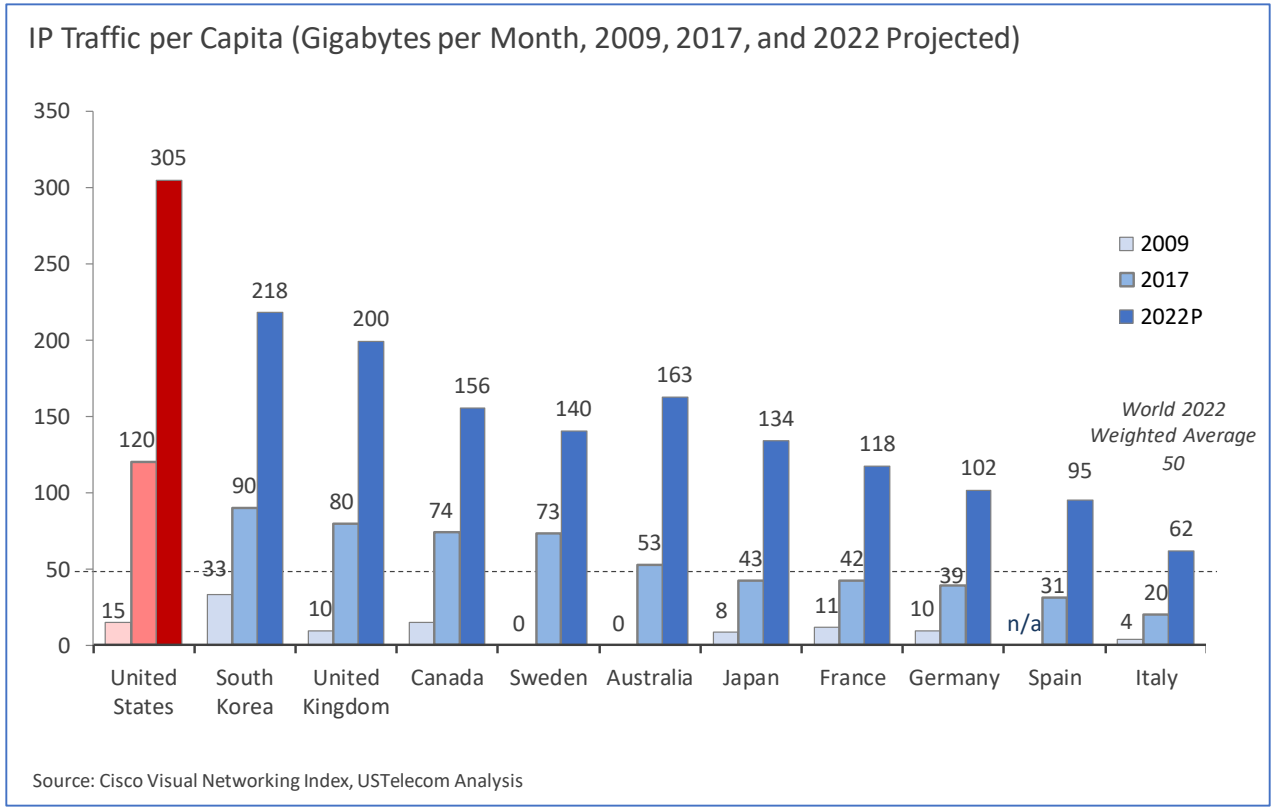
North America Leads the World in IP Traffic per Capita



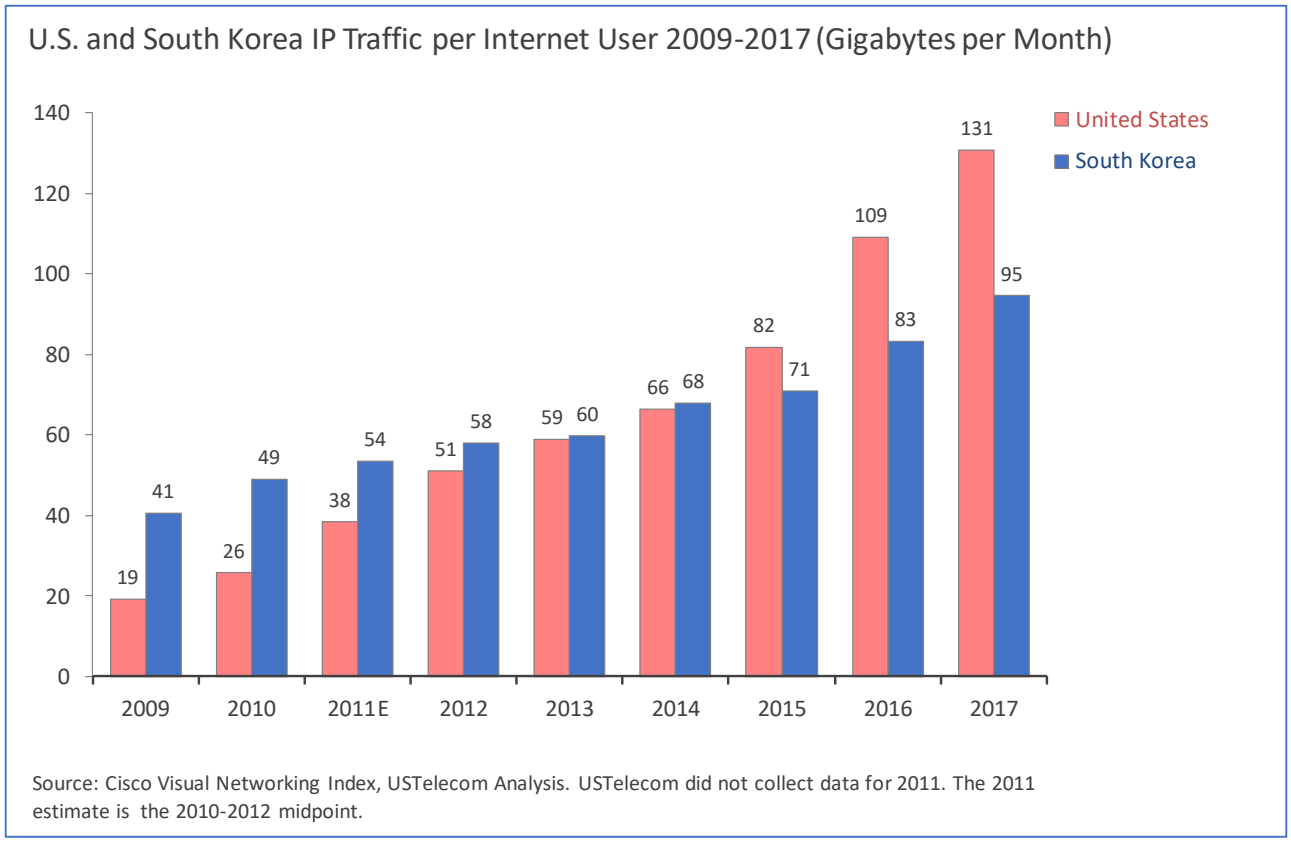
North America Leads the World in IP Traffic per User



The U.S. Leads Other Industrialized Nations in IP Traffic per Capita



The U.S. Has Surpassed Former Leader South Korea and Now Leads the World in Internet Traffic per User



Source: Cisco Visual Networking Index, USTelecom Analysis. USTelecom did not collect data for 2011. The 2011 estimate is the 2010-2012 midpoint.

Notes on Data and Sources

Data and projections: Unless otherwise noted, the data in this presentation are based on sources that are current through mid-year 2019 for broadband deployment, year-end 2018 for voice connections, and year-end 2017 for broadband connections and Internet traffic . Projections are denoted with a "P". In the first two sections, projections through 2020 are USTelecom straight-line estimates based on the most recent 6-month trends. Accuracy of projections is not guaranteed, and may depend on factors such as level of aggregation, technological maturity, seasonality, and adoption curves. In the third section, Internet traffic projections are provided directly by our source.

Terminology: As used in this presentation, broadband includes fixed and mobile services. Mobile broadband is provided over cellular wireless networks. Wired broadband is a subset of fixed broadband and predominantly includes services using fiber, DSL, and cable technologies. Fixed broadband includes wired broadband plus fixed wireless and, sometimes, satellite. The broadband deployment data below exclude satellite from fixed broadband while the broadband connections data include satellite in fixed broadband.

Additional USTelecom Research Resources

- USTelecom Research Brief: *U.S. Broadband Availability Mid-Year 2018* (November 14, 2019)
- USTelecom Research Brief: *U.S. Broadband Availability Year-End 2017* (July 31, 2019)
- USTelecom Research Brief: *Broadband Investment 2018* (July 31, 2019)
- USTelecom Research Brief: *U.S. Internet Usage and Global Leadership Are Expanding* (November 27, 2017)
- Tony Clark and Monica Martinez: *Redefining Legacy Obligations: The More Things Change, the More Things Need to Change* (September 20, 2019)