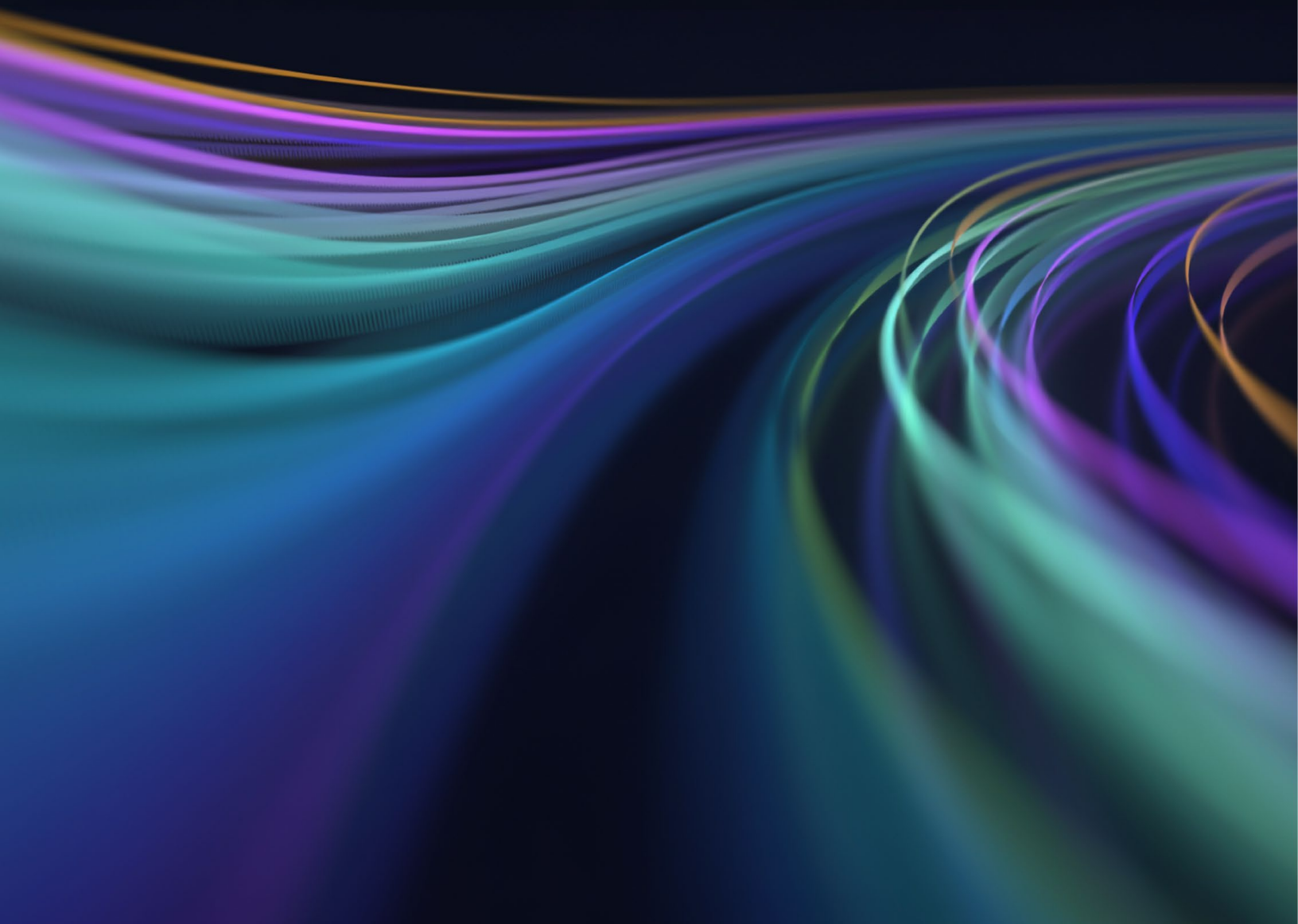


The Impact of
5G Fixed Wireless Access Entry
on Competition in the U.S. Residential Broadband Market

Prepared for CTIA
Author: James E. Prieger



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Executive Summary

In the span of a few years, 5G fixed wireless access (FWA) has grown from a niche offering into the fastest-growing home broadband technology in the United States. T-Mobile, Verizon, and AT&T together serve roughly 17 million home internet customers over their 5G networks, and FWA meeting the FCC's 100 Mbps download/20 Mbps upload benchmark now reaches more than half of the nation's broadband-serviceable locations.

This report investigates what that wave of entry has meant for competition in residential broadband, and in particular for the prices charged by the incumbents that FWA challenges most directly: cable operators. The evidence indicates that FWA entry has had a substantial and measurable competitive effect. In local markets where T-Mobile, AT&T, or Verizon launched 5G fixed wireless home internet, cable broadband prices were approximately 12 percent lower than the estimated counterfactual price—what prices would have been absent FWA entry. Compared with the no-entry scenario, that is a reduction of about \$11 per month on a standalone internet plan.

That estimate comes from the staggered way the three carriers rolled out service, reaching different communities at different times over 2022–2025, the period studied here. That staggered timing lets us compare prices cable subscribers paid after entry in one set of communities to prices over the same months in otherwise-similar communities the carriers had not yet reached. The comparison nets out everything that moved cable prices everywhere at once (factors such as inflation, input costs, industry-wide pricing strategy) and isolates the effect of fixed wireless entry itself.

The competitive effect deepens over time: **prices were about 8 percent lower in the first six months after entry and approximately 17 percent lower during months seven through twelve.** Cable operators concentrated their response on standalone internet plans, which are the plans held by the customers best able to switch to a fixed wireless alternative, rather than on bundles.

The response is large relative to the entrant's national market share. Fixed wireless accounts for roughly 3.6 percent of fixed broadband connections nationally, yet it moved incumbent prices by about 12 percent in the first half-year after entry in the markets it entered. That is the pattern economic theory predicts when an entrant is credible enough that incumbents respond to the threat of customer switching rather than waiting for subscriber losses to accumulate. Case studies of three markets—T-Mobile in Denver, Verizon in Tampa, and AT&T in Las Vegas—trace the same

sequence in the public record: a flat, all-in, contract-free entry offer, followed some months later by an incumbent repositioning on price and terms.

Nor does a monthly price capture the whole of the incumbents' response. Multi-year price guarantees, the inclusion of equipment fees in headline rates, free speed increases, outage credits, and the removal of contracts and data caps may leave the reported monthly price unchanged while improving the customer's overall service terms. The 12 percent estimate should therefore be interpreted as a conservative measure of the consumer benefit to cable customers, not as a complete accounting of that benefit.

The savings are large in the aggregate. The empirical evidence firmly establishes that FWA entry saved cable subscribers approximately \$776 million during the first year in markets entered in 2023. Although this is the narrowest and best-supported single estimate in the report, it captures only a fraction of the broader potential savings. To begin with, the markets FWA entered in 2023 account for only 13 percent of the current footprint where FWA offerings overlap with cable coverage. Assuming that the estimated price impact holds across the entire competitive footprint, including areas with earlier FWA entry, subscribers who remained with cable service saved approximately \$5.0 billion in 2023 alone. Examining the cumulative impact from 2023 through 2025, as FWA was gradually deployed, indicates that FWA competition saved cable subscribers as much as \$20.8 billion. Over the same period, FWA subscribers themselves saved an additional \$4.6 billion to \$7.8 billion by paying less than they would have for a cable plan of comparable speed. In total, **fixed wireless entry saved American households as much as \$28.5 billion on home internet service from 2023 through 2025.**

The accompanying Consumer Savings Appendix explores possible scenarios of consumer savings. The range of savings across the scenarios is admittedly wide because the data do not determine how broadly the measured price effect should be extrapolated beyond the markets and months used to estimate it. The high-end estimate presented above assumes that markets that fixed wireless had already reached before the price data begin responded in the same way, and that the effect is larger in the second and succeeding years after entry (as the data indicate). A narrower-scope estimate discussed below applies the measured effect only to the markets and months used to identify it, rather than extrapolating to other markets or longer periods. Every figure here, wide and narrow alike, counts only what appears in the monthly price, and so leaves out the additional value to consumers of the price guarantees, simplified fees, and contract-free terms described above.

These competitive benefits depend on access to licensed spectrum. Because FWA shares network capacity with mobile service, carriers must manage subscriptions on an address-by-address basis so that performance does not degrade. Given real-world constraints on network infrastructure and spectrum efficiency, the amount of available spectrum directly determines how many households a provider can support. Consequently, spectrum availability and capacity constrain how many communities can receive the competitive benefits associated with fixed wireless entry. With the FCC's auction authority restored, the AWS-3 auction completed, and an upper C-band auction

scheduled for April 2027, the spectrum pipeline now in motion will shape how far these benefits extend. The bands currently under NTIA study provide the next opportunity to build on these results.

1. The Rise of 5G Fixed Wireless Access

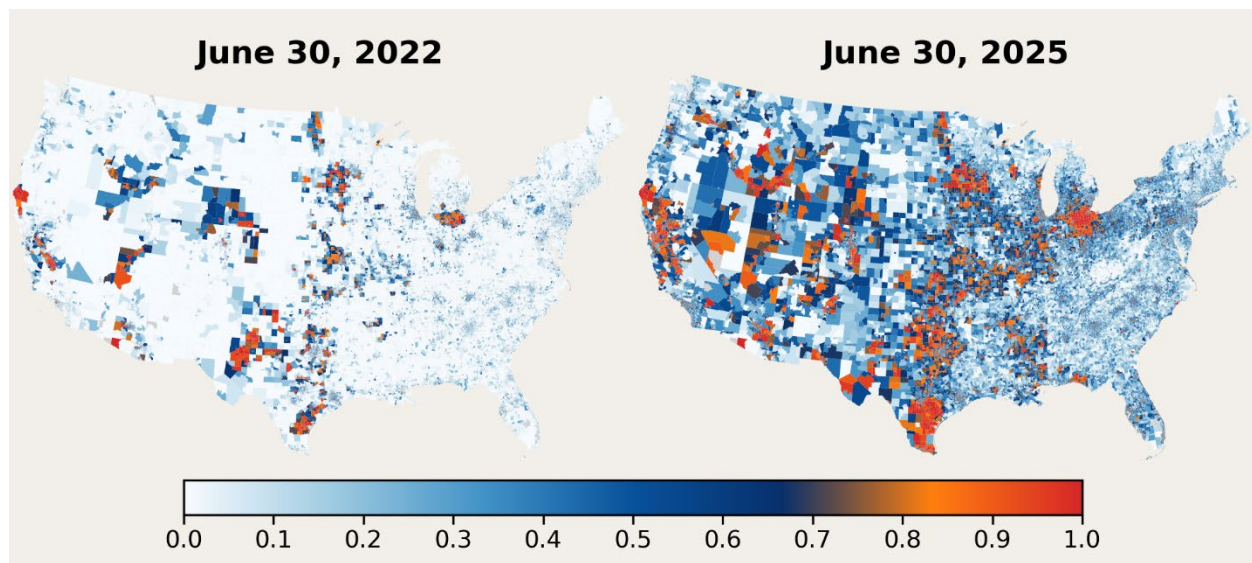
Fixed wireless residential internet is not new, but its 5G incarnation differs from the small-scale, slower fixed wireless services that preceded it. Verizon introduced 5G Home in a handful of cities in late 2018, T-Mobile launched its Home Internet service nationwide in April 2021, and AT&T followed with Internet Air for consumers in August 2023.¹ In most areas, 5G FWA added a competitive option for households whose former main choice was cable service, while in other places FWA expanded high-speed access to new areas. The carriers use capacity on licensed mid-band 5G networks built primarily for mobile service to deliver home broadband through a self-installed gateway.² The service is typically sold at a flat monthly rate with taxes and fees included, no annual contract, no data cap, and no equipment charge.

Consumers responded quickly. The three national carriers together added millions of home internet customers each year from 2022 through 2025. By 2026, the three carriers served approximately 16.7 million home-internet customers: 8.5 million for T-Mobile, 6.2 million for Verizon, and 2 million for AT&T.³ Counting all 5G fixed wireless providers, the technology's share of U.S. fixed broadband connections has risen to about 3.6 percent.⁴

Growing FWA coverage

Serving consumers in a local area requires both network infrastructure and access to spectrum. The wireless carriers acquired substantial spectrum or put existing holdings to use and deployed the infrastructure needed to deliver 5G FWA service. FWA's resulting geographic reach has expanded at a swift pace. Figure 1 maps the expansion across the country of FWA meeting the FCC's speed benchmark of 100 Mbps download and 20 Mbps upload.⁵ For locations covered by the main technologies meeting that standard,⁶ the maps show the share of locations in each Census tract covered by 5G fixed wireless at the beginning and end of the study period. What began as scattered pockets of coverage in mid-2022 had become, with some rural exceptions, a widespread footprint with many high-density areas by mid-2025.

Figure 1: Share of Locations in Each Census Tract Covered by 5G Fixed Wireless

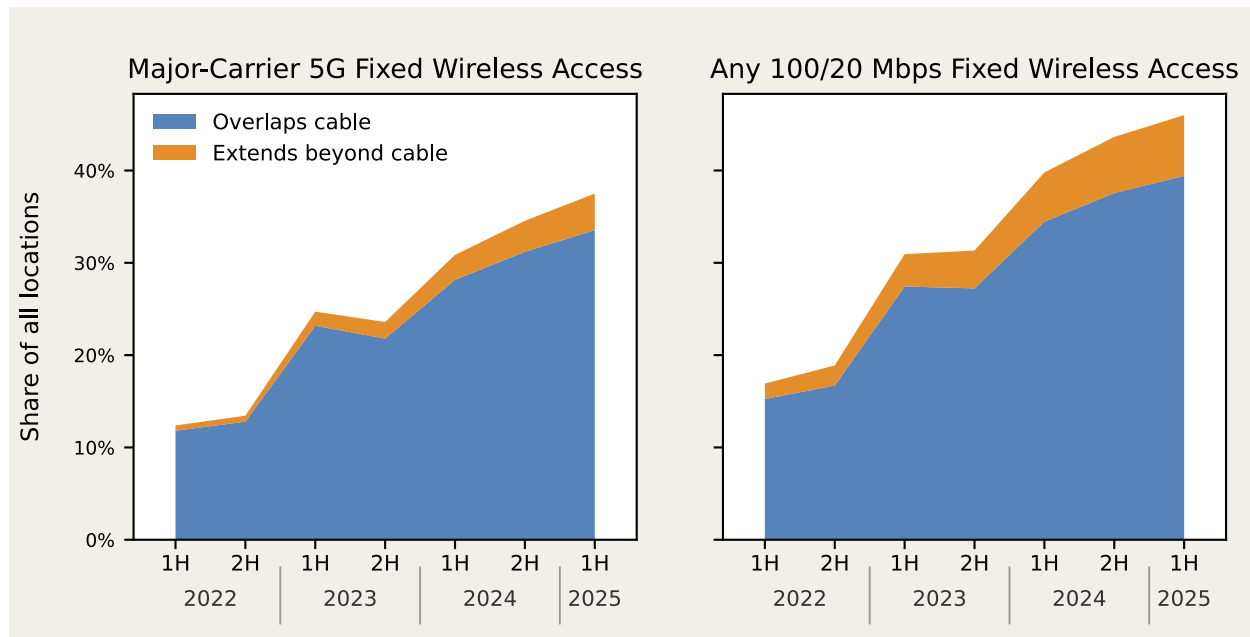


Note: Share of all locations in tract with reported FWA availability at 5G speed ($\geq 100/20$ Mbps, any provider; see endnote 5). Data are from FCC BDC, analyzed by the author. The denominator for the share computations is all broadband-serviceable locations served by FWA, cable, or fiber residential service (see endnote 6).

While coverage maps illustrate service footprints, accessibility to FWA is best measured by where the consumers are: all specific broadband-serviceable locations. By June 2025, FWA providers already offered service at 100/20 Mbps or better to more than half of the nation's residential broadband-serviceable locations.⁷ Figure 2 shows how FWA's footprint overlaps with cable's coverage area, with FWA from T-Mobile, Verizon, and AT&T (the focus of the empirical work regarding the effect of entry) in the left panel of the figure and all providers in the right panel. Regardless of which group is examined, most locations covered by 5G fixed wireless also can be served by a cable operator. As a result, the two technologies compete head-to-head across most of the FWA footprint. In addition, a small but meaningful share of the FWA footprint extends beyond cable's reach entirely, providing a vital option for affordably priced, mid-tier-speed broadband where none existed before. The extension covers 6.6 percent of broadband locations for any 5G-speed FWA and 4.0 percent for FWA from T-Mobile, Verizon, and AT&T.⁸

These figures are even starker in rural areas. The latest statistics from the FCC indicate that in rural areas, 11.5 percent of broadband-serviceable locations have access to fixed wireless service at 100/20 Mbps but no other fixed terrestrial services.⁹

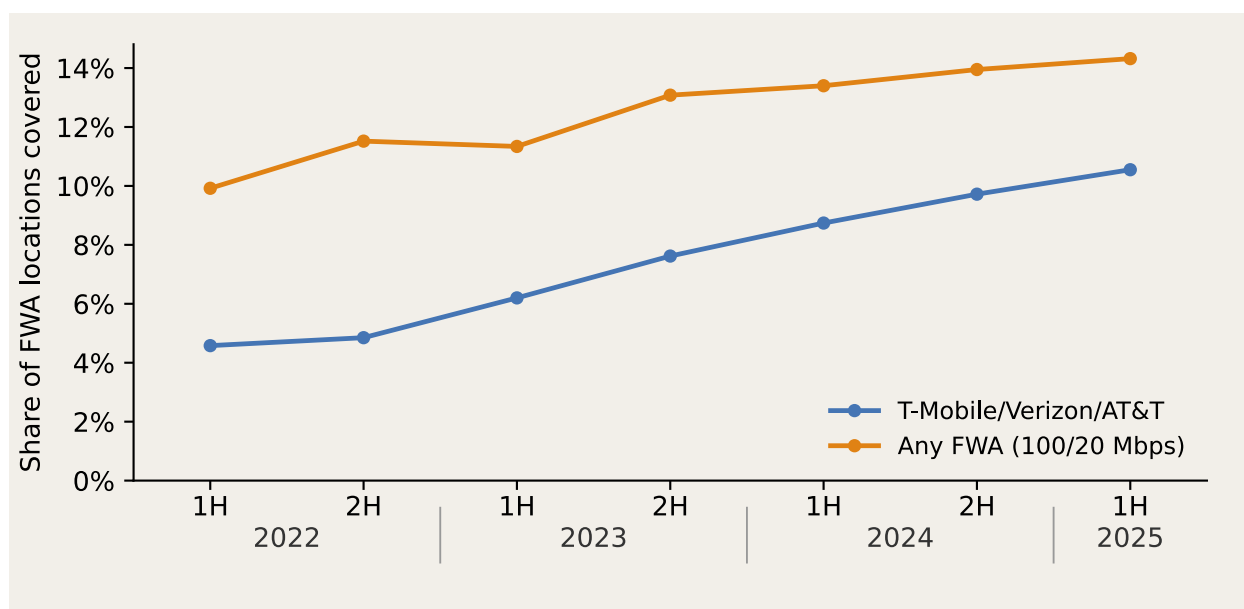
Figure 2: 5G Fixed Wireless Coverage of Broadband Locations: Overlap with and Extension Beyond Cable Coverage



Note: Figure shows the share of all locations that can be served by fixed wireless for residential internet access at speeds of 100/20 Mbps or better. The left panel shows FWA from T-Mobile, Verizon, and AT&T; the right panel shows FWA from all wireless internet service providers (WISPs). Blue areas show where cable internet can also serve the locations; orange shows where FWA extends beyond locations served by cable. The denominator for the share computations is all broadband-serviceable locations served by FWA, cable, or fiber residential service. Locations are those in the mainland U.S. Data are from FCC BDC, analyzed by the author.

Figure 3 isolates those locations that 5G fixed wireless can serve but no cable operator can. For roughly one in seven locations fixed wireless at 5G speeds can reach, no cable operator offers service at all. In those places fixed wireless is not disciplining an incumbent's price as it does elsewhere; it is instead usually the first reasonably priced, high-speed terrestrial option the household has been offered. While most areas in the U.S. can access satellite internet service, many consumers do not view it as a close substitute for terrestrial services because of its higher latency, other performance limitations, and, until recently, higher price per unit of speed.

Figure 3: Share of 5G Fixed Wireless Locations with No Cable Coverage



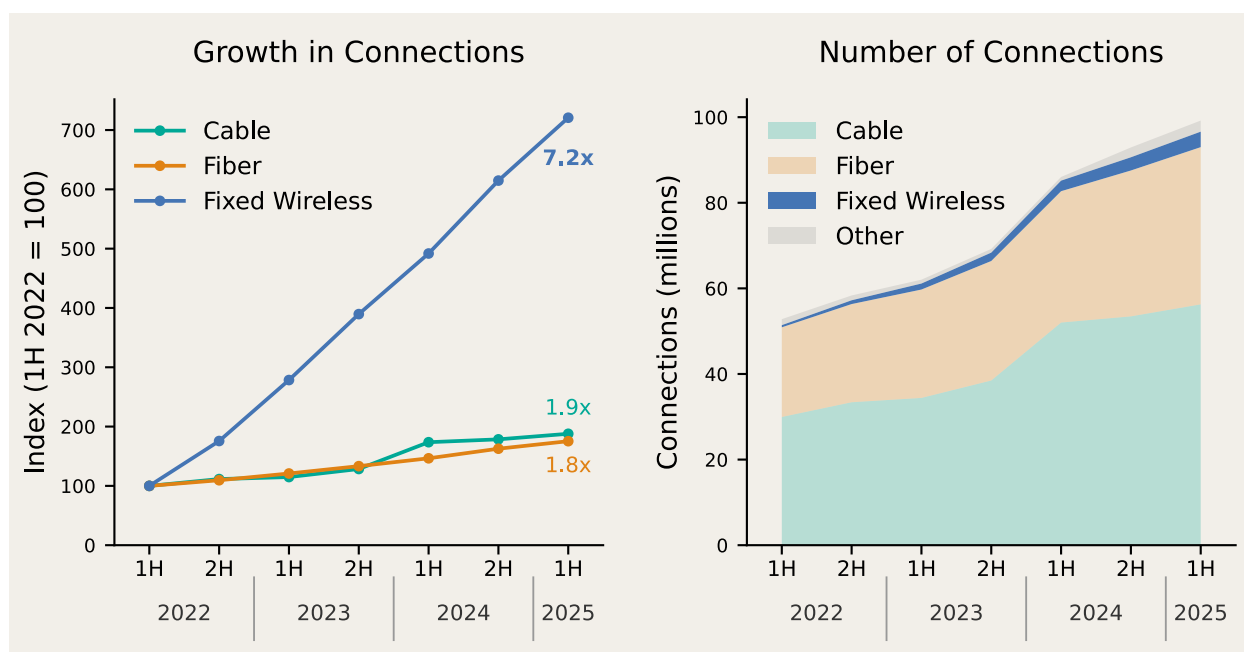
Note: Figure shows the share of all locations that can be served by 5G fixed wireless for residential internet access that are not able to be served by cable internet providers. Locations are those in the mainland U.S. Data are from FCC BDC, analyzed by the author.

Growing FWA demand

Expanding FWA coverage has been eagerly embraced by millions of households, and it has rapidly become an important source of new broadband connections. In fact, fixed wireless access has experienced the fastest subscriber growth rate of any fixed broadband technology in recent years, and one of the fastest in U.S. history. Figure 4 tracks fixed broadband connections meeting the 100/20 Mbps threshold, both as growth relative to the first half of 2022 (left panel) and in levels (right panel). Fixed wireless growth dwarfs that of cable and fiber over this period, though from a much smaller base. Note that if growth is measured from a baseline only one year earlier (June 2021), then fixed wireless connections grew by over 20 times (vs. less than 3 times for cable and fiber). While the figures in the right panel of Figure 4 imply that FWA's national market share remains small at about 3.6 percent, this study shows that its competitive impact on the incumbent broadband providers has been substantial.

In summary, fixed wireless plays two important roles in the broadband market: a competitor where wired broadband already exists, and an access technology where it does not. Both matter for consumers. We quantify both, though by different methods. The latter role is quantified directly, through straightforward accounting of coverage areas where fixed wireless extends broadband access to consumers, as in Figures 2 and 3. The competitive role instead requires a causal estimate, since no coverage count can say what cable prices would have been absent entry. This report's main contribution is that econometric estimate, which underlies the total savings estimates for cable and fixed-wireless customers.

Figure 4: Fixed Broadband Connections at 100/20 Mbps, by Technology: Growth and Number



Note: The left panel shows growth in fixed broadband connections from any provider meeting the FCC's speed threshold of 100 Mbps downstream and 20 Mbps upstream, indexed to 1H 2022 = 100; the right panel shows the same connections as levels, in millions. Both panels group connections by technology: "Cable" refers to coaxial cable, and "Fiber" to optical carrier connections. Copper wire and satellite connections are suppressed in the source; the right panel's "Other" category represents the combined total for those technologies, calculated by subtracting cable, fiber, and FWA from the reported total. Figures are for all connections (residential and business). Data are from Figure 28 of the FCC's Internet Access Services report (status as of June 30, 2025), analyzed by the author, and include all U.S. states, the District of Columbia, and U.S. territories. "1H" and "2H" refer to data as of June 30 and December 31 of each year, respectively.

2. Why FWA Entry Matters for Competition

The U.S. residential fixed broadband market has long been characterized by the dominance of cable providers, alongside continued expansion of fiber networks. The FCC's latest data show that cable accounts for almost three of every five residential fixed broadband connections.¹⁰ For many households, the practical choice in home broadband has been a single cable operator, perhaps alongside a slower legacy DSL option. Fiber construction is changing that picture in some places, but building a new wired network is slow and expensive, and large parts of the country remain a one- or two-provider market for wired high-speed service. In 2025, the average Census block, which is typically a small part of a neighborhood in non-rural areas, had one cable provider and an average of 0.7 fiber providers.¹¹

The innovative technology of FWA has altered these competitive dynamics, due to its relatively low deployment costs in many areas compared to wired technologies and its ability to serve both underserved areas and markets with existing broadband providers. A large body of economic research in industrial organization shows that the competitive impact of new entrants is not determined solely by the market share they capture. In markets with a small number of dominant

incumbents, such entry can discipline pricing and improve service quality. Firms respond to the threat of customer switching rather than waiting for large market share losses to materialize.¹²

Whether that potential has been realized is the central question of this study: did the arrival of FWA actually cause cable incumbents to lower their prices? Secondary questions concern how the effect evolves in the months after entry and which plans bore the competitive response. The answers matter for policymakers, consumers, and industry stakeholders alike, informing discussions of competition policy, spectrum allocation, and the design of broadband subsidy programs.

3. How We Measured the Impact

The prices in this study are prices consumers actually pay, not advertised rates. They come from Recon Analytics' *Consumer Wireless & Internet Pulse*, a continuous survey program that records the provider, monthly price, and plan characteristics reported by subscribing households. We draw on survey responses from more than 230,000 households subscribing to the three largest cable operators—Charter, Comcast, and Cox. The observations are identified by ZIP code and cover the period from the second half of 2022 through the end of 2025.¹³ Due to availability of data from other sources, and the fact that FWA had already entered most tracts before 2025, the sample for the econometric estimation is the second half of 2022 through the end of 2024, although the survey data on prices for 2025 are used elsewhere in the total savings calculations. The data distinguish standalone internet plans from bundles as well as promotional from standard rates.

Where and when fixed wireless entered comes from the FCC's Broadband Data Collection (BDC), in which every provider reports the specific locations at which it offers residential service and at what advertised maximum speeds. For purposes of the analysis, a Census tract is considered entered after T-Mobile, Verizon, or AT&T first reports offering residential FWA in that tract at speeds of at least 100/20 Mbps.

The three carriers did not launch everywhere at once, as Figure 1 above makes clear. They reached different communities at different times over 2022–2025, and that staggered rollout is what makes possible the estimation of the causal impact of their entry. For each community where fixed wireless arrived, we tracked cable prices before and afterward. We compared those prices against what happened over the same period in communities the carriers had not yet reached. Areas awaiting entry serve as a stand-in for what the entered areas would have looked like had entry not occurred. The gap between the two is our estimate of the impact of fixed wireless entry. The comparison also accounts for local characteristics that shape broadband prices, including demographics and income. Supplementary specifications also control for the local mix of jobs that can be done from home, the cost of deploying networks in the local terrain, the presence of federal broadband subsidies, and other relevant cost and demand factors.

It is important to be precise about what the resulting estimate means. The 12 percent figure for the price decline reported below is a gap against what prices would otherwise have been; it does not

measure the change in prices over time. Broadband internet prices reflect the combined influence of multiple forces, including input costs, industry-wide pricing strategy, promotional cycles, and general inflation, and those forces operated in entered and non-entered markets alike. Prices are therefore constantly changing; from 2022 to 2025, the 12-month change in the CPI for internet services ranged from +5 to -3 percent.¹⁴ Our method deliberately nets out the influence of those forces. The practical consequence is that a subscriber's bill in an entered market may have risen, held flat, or fallen in absolute terms; any of those is fully consistent with a 12 percent competitive effect. A useful analogy is a swimmer in a current: the estimate concerns the swimmer's movement relative to the current, not merely the swimmer's change in position relative to shore. A market-wide upward drift in prices can carry bills higher even while fixed wireless competition pulls them down relative to where they would otherwise have gone.

We made deliberately conservative choices along the way, including setting aside comparisons resting on very small numbers of communities. A full technical treatment appears in the Econometric Appendix accompanying this report.¹⁵

Estimating the total dollar value of the price effect requires a separate calculation. The econometric estimate is a percentage, so converting it into money saved requires knowing how many households were exposed to entry and what they were paying. The count of cable households is estimated from the FCC's location-level records of where cable service is available, scaled down by the national share of homes that subscribe to cable. The cable prices to which the estimated percentage savings is applied comes from the Recon Analytics survey for the areas with FWA competition. We treat FWA subscribers separately. Their estimated savings equal the difference between what they pay for FWA and what a cable plan offering a comparable delivered speed would have cost. Adding the two groups together gives the total savings.

The remaining question is reach: how far should the measured effect be applied beyond the markets and months that produced the estimate? We report four illustrative scenarios that reflect different assumptions about how far the measured effect should be extrapolated. The assumptions range from applying the effect only where it was directly measured to extending it across the full fixed wireless footprint and allowing it to grow with longer exposure. The full calculation, the sources for each parameter involved, and the detailed results under all four scenarios appear in the Consumer Savings Appendix accompanying this report.¹⁶

4. What We Found

Cable prices were about 12 percent lower where FWA entered

In markets the three national carriers entered, cable broadband prices during the first year after entry averaged about 12 percent below what they would have been absent entry. The comparison is to the price path these markets were otherwise on, not to prices before entry. For a typical standalone internet plan the entry impact is about \$11 per month, with subscribers in those markets paying roughly \$79 against roughly \$90 on the estimated counterfactual path. The result is

statistically significant at the conventional five percent level used in empirical work, meaning that the estimate is unlikely to reflect random sampling variation alone under the model's assumptions.¹⁷

The competitive effect increased over time

The 12 percent figure is an average across the first year following entry, and it masks a clear upward trajectory within that year. The price response is about 8 percent in the first half-year after a carrier arrives and roughly doubles, to around 17 percent, by the second. The measured impact continues to grow into the third half-year, and grows substantially, though the evidence for that final period rests on a much smaller set of comparison markets. We therefore base the directly estimated savings figure (\$776 million) on the first two periods, where the evidence is strongest. The broader pattern is consistent with competitive pressure that deepens as fixed wireless establishes itself in a market, with spreading awareness, accumulating impact of marketing, and more switching, rather than arriving as a one-time impact.

The response was stronger for standalone internet service

Cable operators appear to have concentrated their price response on standalone internet service rather than on bundled packages combining internet with video, voice, or mobile. When bundled plans are folded into the analysis, the measured impact of fixed wireless entry is much smaller, albeit estimated on a different subsample and with a different set of market controls, so the two figures are not directly comparable. The pattern is consistent with operators choosing to defend the standalone internet customer, who is the one most able to switch to a fixed wireless alternative. Due to the lack of data on the specific components of bundled packages, however, these results should be interpreted more cautiously than the estimated price impact.

The finding remains consistent under different analyses

Beyond its statistical significance, the econometric estimate is robust to how it is constructed in several respects. Measuring the typical price by the average or the median gives nearly the same result, and varying the set of market characteristics controlled for, restricting to non-promotional pricing, and changing how gaps in the underlying coverage data are handled each move the estimate by only a percentage point or two.

One choice does matter a great deal: basing the headline figure on the first two half-years after entry rather than including the third as well. As noted above, the data indicate that the impact from FWA competition accelerates sharply over time. Including the third six-month period would have increased the headline estimate from approximately 12 percent to 28 percent, but the estimate would have been less sure because it relies on fewer comparison markets.

What the savings add up to

Scaled across affected markets, the amounts are substantial. For cable subscribers who stayed with their cable provider in markets the three national FWA carriers entered during 2023 alone, the

12 percent price effect translates into roughly \$776 million saved on cable internet bills over the first year following entry. The estimate covers approximately 5.9 million households. Together they spent about \$5.65 billion on standalone cable internet over the year, compared with approximately \$6.43 billion that those households would have paid had the carriers not entered.

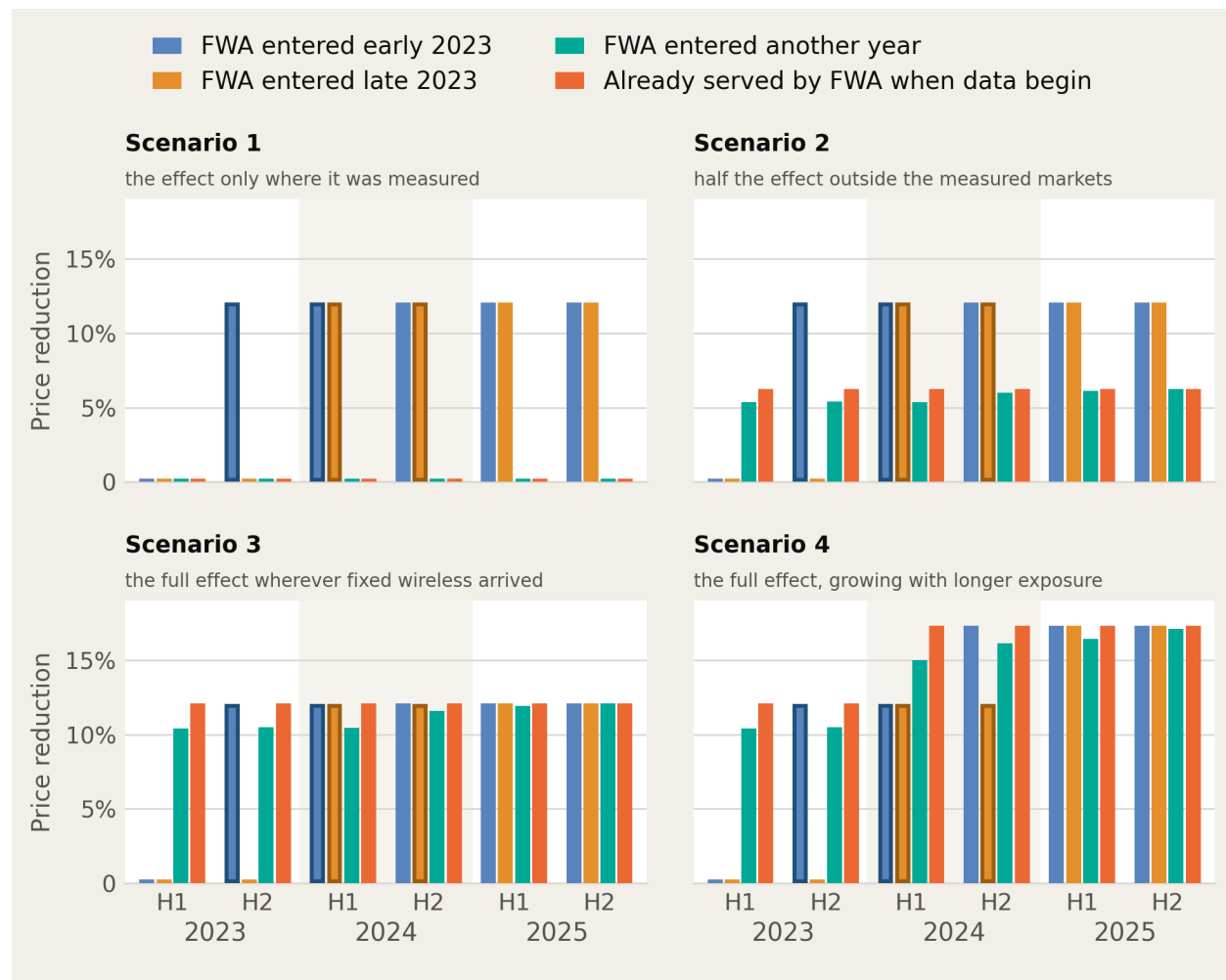
That figure anchors the accounting, because it stays inside the markets and months from which the price effect was estimated. It is also a small slice of the whole. The 5.9 million households behind it were just 13 percent of all cable subscribers in markets the three carriers entered by mid-2025, and the calculation stops twelve months after entry. The remaining 87 percent are not included in this portion of the calculations, not because their prices were untouched, but because the before-and-after comparison is cleanest in the markets entered during 2023.

In a companion analysis, we extend the accounting to the rest of the affected population, dividing consumers into three groups.¹⁸ The first is the group just described: cable subscribers in the markets and months that identify the price effect. The second, far larger group, is cable subscribers everywhere else in the fixed wireless footprint, most of whom were in markets fixed wireless had already reached before the price data begin. The third is FWA subscribers themselves, whose savings equal the difference between what they paid and what a cable plan of comparable delivered speed would have cost them had fixed wireless not entered.

The estimated savings accruing to these three groups depend on how far the price effect is assumed to extend beyond the markets that identify it. In the narrowest scenario, shown as Scenario 1 in Figure 5, the 12 percent price effect applies only to markets entered in 2023 (the identifying markets). The \$776 million saved on cable internet bills over the first year following entry in 2023 mentioned above comes from the outlined bars in Figure 5 (in any scenario). Scenario 2 extends half the price effect to every other entered market, a deliberately conservative assumption. Scenario 3 applies the full effect in those same markets, and Scenario 4 raises it to 17 percent from the third half-year after entry onward.¹⁹ In Scenarios 3 and 4, the price effects shown in the relevant panels of Figure 5 imply savings to all cable subscribers in entered markets of approximately \$5.0 billion in 2023 alone. Savings to FWA customers are computed the same way in every scenario (and thus not shown in Figure 5) as the gap between the cable bill they would have faced and the price they paid for fixed wireless.

Summed over 2023 through 2025, cable and fixed wireless subscribers saved from an estimated \$6.4 billion, under the narrowest assumed reach of the price effect, to \$28.5 billion, under the broadest reach with the effect growing over time (see Table 1). Fixed wireless subscribers account for \$4.6 billion to \$7.8 billion of that total, and cable subscribers who stayed with their provider for the remainder, \$1.8 billion to \$20.8 billion. These figures are in current dollars (i.e., not adjusted for inflation). The savings accrue over three years, so a nominal sum adds dollars of unequal purchasing power; in constant first-half-2026 dollars the totals range from \$6.7 billion to \$30.0 billion.

Figure 5: How far each scenario extends the measured price effect to cable households



Note: Bars give the assumed reduction in the cable price relative to what that price would have been without fixed wireless entry, by half-year and by group of markets. The measured price effect is 12 percent. Outlined bars are the twelve months in the 2023-entry markets from which the post-entry effect was estimated; every other bar extends that estimate by assumption. Scenario 2 applies half of the price effect outside the markets that identify the estimate, and Scenario 4 replaces it with a larger 17 percent effect from the third half-year of exposure onward. A flat mark on the baseline means no effect is assumed for that group in that period. No effect is assigned in the half-year in which fixed wireless arrives, so a market's first bar appears in the following half-year. Bars for markets entered in another year are averages across markets whose entry dates differ, weighted by cable households, and so fall between the round values. Savings to fixed wireless subscribers are not shown: their saving is the gap between the cable bill they would have faced and the price they paid for fixed wireless, computed the same way in every scenario. The Consumer Savings Appendix gives the four scenarios in detail.

A few caveats apply. Since the four scenarios represent differing assumptions, the range across them should not be interpreted as a confidence interval. Furthermore, these totals are illustrative estimates of expenditure savings, not estimates of total consumer welfare. A welfare measure would also account for the value of improved service terms and the change in consumer surplus received by households that switched.²⁰

Table 1: Estimated consumer savings from 5G fixed wireless entry, 2023 through 2025

Subscriber Group	Scenario 1 (\$ millions)	Scenario 2 (\$ millions)	Scenario 3 (\$ millions)	Scenario 4 (\$ millions)
Cable subscribers in the markets and periods that measure the price effect	776	776	776	776
Cable subscribers elsewhere in the fixed wireless service area (and in markets above in later periods)	1,017	7,666	14,756	19,994
Fixed wireless subscribers in the cable service area	4,608	5,674	6,811	7,779
Total	6,401	14,116	22,343	28,549
Total in first-half-2026 dollars	6,726	14,860	23,534	29,984

Note: Figures are estimated reductions in household spending on residential internet service over 2023 through 2025, in current dollars except in the final row. For definition of the scenarios, see text and notes to Figure 5. The savings in the first row stem from the estimated price effects represented by the outlined bars in Figure 5; those in the second row follow from the assumed price effects represented by all the other (non-outlined) bars in Figure 5. The final row restates the totals in constant first-half-2026 dollars. All figures count only savings that appear in the monthly price. Source: Consumer Savings Appendix, Table 1.

Nearly the entire width of the range of savings across the different scenarios is attributable to the second row of the table. Estimated savings to cable subscribers outside the markets that identify the price effect range from \$1.0 billion to \$20.0 billion. By comparison, estimated savings to fixed wireless subscribers vary by approximately \$3 billion across the scenarios, and savings in the identifying markets do not vary at all.

As before, every one of these figures counts only what shows up in the monthly price, leaving out the price locks, fee transparency, and contract-free terms described above. Fixed wireless customers enjoyed those terms first, but many cable customers later saw the same terms appear on their own bills as incumbents matched them.

5. A Closer Look at Three Markets: Case Studies of Cable's Response to FWA Entry

The statistical evidence above averages over thousands of local markets. To illustrate how the competitive mechanism can play out in practice, this section examines three individual markets: T-Mobile in Denver, Verizon in Tampa, and AT&T in Las Vegas. In each of these cases, the public record clearly documents the sequence of events. They are intended as illustrations of the mechanisms at work rather than as evidence that FWA entry caused the observed pricing responses; the systematic evidence on causation remains that presented in Section 4. A closing subsection draws out what the three markets have in common and sets out the qualifications that apply to all of them.

T-Mobile and Comcast in Denver, Colorado

The Denver metropolitan area, home to about three million people, sits at the center of Comcast's Mountain West operations and has long been Xfinity territory for wired broadband service. Lumen (formerly CenturyLink), the local telephone company, offered DSL across its service area but fiber in only part of the metro area; a few smaller fiber overbuilders added scattered competition, though not always for residential customers. For most Denver-area households through the early 2020s, Xfinity was the default choice for high-speed service.

Xfinity's pricing followed the promotional pattern common to cable: low introductory rates for new customers that step up sharply once the discount lapses. In mid-2022, standard, nonpromotional rates ran from \$50 per month at the entry tier to \$100 at gigabit speeds (increases of 25 to as much as 150 percent over the first-year price, depending on the plan). On top of that came a further \$14 per month for the Xfinity Wi-Fi gateway.²¹ The step-ups from promotional to ongoing prices were in addition to Comcast's annual adjustments to its standard pricing, including increases that took effect in December 2021 (about 3 percent) and December 2022 (3.8 percent).²²

T-Mobile Home Internet reached the Denver area as part of a regional expansion announced June 30, 2022, with the stated aim of "disrupting" the "broken [broadband] industry." Colorado state legislators specifically welcomed the move as new competition for the Denver–Aurora corridor.²³ The terms set the template that the other carriers would follow: \$50 per month with autopay, or \$30 for T-Mobile's top mobile-plan customers, with no annual contract, no hard data caps, no equipment fee, and self-installation in about fifteen minutes. T-Mobile was not the only fixed wireless provider in Denver. Verizon began offering service there in late 2020, and AT&T followed in 2023. But T-Mobile was the carrier that most explicitly targeted cable customers.

It escalated that pitch six months later. In December 2022, days after Comcast's latest price increase took effect, T-Mobile launched a national campaign it called "Make Xfinity Your Ex," offering Comcast customers up to \$750 to cover early-termination fees plus T-Mobile Home Internet at \$25 per month for those with a qualifying wireless line, which was about half the standard rate.²⁴ T-Mobile stated at the time that more than half of its two million Home Internet subscribers nationally had come from the large cable providers, Comcast among them. That the entrant's own subscriber data pointed squarely at cable is evidence of the head-to-head substitution the estimates in Section 4 are designed to detect.

Comcast's own competitive response arrived in April 2025, when the company introduced a five-year price guarantee on Xfinity internet plans nationwide: locked pricing with no annual contract, unlimited data included, and rates starting at \$55 per month. Coverage of the announcement noted that it followed Verizon's introduction of a three-year price guarantee on its own fixed wireless and fiber plans, framing Comcast's move explicitly as a response to price-certainty offers from the wireless carriers.²⁵

Verizon and Charter in Tampa, Florida

Verizon sold its Tampa-area FiOS fiber network to Frontier in 2016 and exited the local wireline market. Less than a decade later it returned, this time without wires. In the interim, the Tampa Bay region, with more than three million residents and one of the larger markets in Charter's service area, remained firmly Spectrum's for wired broadband, with the Frontier fiber Verizon had built reaching only parts of the metro area.

Before Verizon's FWA entry in 2021, Spectrum's pricing had the same two-tier architecture. The flagship 200 Mbps plan was advertised at \$50 per month for the first year and reverted to a standard rate of about \$70 thereafter; faster tiers carried a \$20-to-\$30 step-up, plus a \$5 monthly Wi-Fi equipment fee.²⁶ Spectrum's plans came with neither data caps nor contracts. What the brand did not offer was the feature fixed wireless would soon sell hardest: a price that stays put.

Verizon's 5G Home service reached parts of Tampa in April 2021, running first on high-frequency millimeter-wave spectrum with limited reach. In 2023, Verizon added its newly acquired C-band spectrum to expand the addressable footprint of 5G Home in the metro area.²⁷ The headline price was familiar: \$50 per month with autopay, or substantially less bundled with a qualifying mobile plan, with no equipment fees, data caps, or annual contracts. What distinguished the offer was what Verizon attached to it: an explicit two- or three-year price guarantee, and a willingness to cover early-termination fees for customers breaking a contract with their existing provider.²⁸

Charter responded in two stages. In October 2022 it launched Spectrum One, a bundle of internet, advanced Wi-Fi, and an unlimited mobile line promotionally priced at \$50 per month for its first twelve months.²⁹ That matched the wireless entrants' headline price, albeit only during the promotional period, and sweetened the deal for consumers by expanding to a bundle of services. The second wave came in September 2024, when Spectrum relaunched its consumer offer under the "Life Unlimited" banner: straightforward, all-inclusive pricing; multi-year price guarantees; automatic speed increases at no additional charge for existing customers; credits for service outages; and a 500 Mbps plan at \$30 per month when bundled with mobile lines. Trade coverage attributed the relaunch directly to customer losses and to pressure from lower-cost wireless alternatives.³⁰

AT&T and Cox in Las Vegas, Nevada

AT&T never operated a wireline last-mile network in Las Vegas. Nevada Bell served Reno and the north of the state, but the Las Vegas valley was Centel territory, later CenturyLink and today Lumen, whose fiber covers only a fraction of the valley.³¹ Any competition AT&T could bring to the region's more than two million residents would have to arrive over the air, into a market where Cox had long been the dominant wired broadband provider.

Cox's rates and terms in the period surrounding entry carried the fullest version of the practices that fixed wireless offers were built to attack. Advertised rates were first-year promotions, with all but the lowest-tier plan (priced at \$50 per month) discounted 20 to 40 percent off the standard rate. On top of the plan price came a \$10.99 monthly Wi-Fi equipment fee and an installation charge of \$20

to \$75, even for self-installation. Plans also carried data caps with overage fees and a default one-year contract with an early-termination fee of up to \$120.³²

In August 2023, AT&T launched Internet Air, its consumer FWA service, in an initial set of sixteen metropolitan areas. The company said it chose Las Vegas and the other markets largely because it offered no other home internet service there.³³ The entry therefore represented a particularly clear example of technology-based competition: a new competitor with no legacy last-mile network, no installed base, and no merely incremental upgrade of an existing service, but home broadband delivered over a new technology. Terms ran to \$55 per month with autopay, or \$35 when bundled with mobile phone service, with no annual contract, data cap, or equipment fee.³⁴ AT&T was in fact the third national wireless entrant to reach Las Vegas households; Verizon had been selling fixed wireless in much of the metro area since 2021 and T-Mobile since 2022. Internet Air's arrival completed the field: a market that only a few years earlier offered most households one cable operator and a telephone company now faced three additional national competitors. Nationally, AT&T's Internet Air service reached two million subscribers by mid-2026 with, by AT&T's own account, minimal marketing.³⁵

Cox initially made incremental changes, followed by broader changes to its offerings and pricing structure. Within about six months of AT&T's arrival, the company had loosened its terms: self-installation, previously \$20 to \$75, became free, and three of Cox's five internet tiers were restructured to carry no annual contract and no cancellation fee.³⁶ The deeper change came afterward: a price lock of three to five years across the lineup, five years when internet is bundled with Cox Mobile, a service the company began promoting in earnest in 2024, alongside simplified, fee-inclusive pricing.³⁷ The competitive pressure was also reflected in Cox's corporate strategy. Cox's owners agreed in 2025 to fold the company into Charter in a \$34.5 billion combination that both companies presented, in part, as a response to the intensity of competition from wireless and other entrants.³⁸

What the three cases show

The three markets differ in nearly every particular. The entrants are different carriers arriving at different dates by different routes: T-Mobile through a nationwide rollout, Verizon by returning to a market it had sold, AT&T into territory where it had never owned a last-mile wire. The incumbents are three different cable operators. Yet the sequence is the same in each. The cable incumbent initially posted offers built on the gap between the promotional price and the standard one, with equipment fees, installation charges, and in some cases contracts and data caps layered on top. A fixed wireless entrant arrived at a flat, all-in monthly rate with no contract and no equipment charge. And the incumbent responded mainly by changing its terms of service.

That last point matters for how the estimates in Section 4 should be read. Charter, Comcast, and Cox are precisely the three operators whose subscriber-reported prices underlie the statistical analysis, so the narratives here and the estimates describe the same firms. But much of what those firms did in response shows up only partly, or not at all, in a measured monthly price. A household paying \$70 under a five-year price guarantee records the same current price in the survey data as a

household paying \$70 under a plan whose price will increase the following year. So does a household whose equipment fee has been folded into the headline rate rather than added to it, or whose speed was lifted at no charge, or who received a credit for an outage. None of that shows up in the 12 percent price effect or the \$776 million figure built on it, which is why, as noted earlier, both are better read as a floor on the consumer benefit than as a full accounting of it. The cases also match the estimates in their timing. In each market the incumbent's substantive repositioning came well after the entrant's arrival and deepened thereafter, which is the pattern the half-year estimates trace when the effect roughly doubles from about 8 percent to about 17 percent.

Several qualifications apply to all three narratives, and they are the reason the case studies illustrate the mechanism rather than establish it. Advertised rack rates are not the transaction prices households actually pay, which is why the statistical analysis uses survey-reported prices instead. None of these markets faced fixed wireless from a single carrier alone: fiber overbuilders were active in Denver, Frontier's fiber served parts of Tampa, and in both Denver and Las Vegas the other two national carriers had entered before the one profiled here. And some events in these histories fall outside the window of the data used for the empirical work.

The incumbent responses described here, including Comcast's price guarantee, Spectrum's relaunch, and Cox's price locks, were national initiatives rather than market-specific reactions, as were several of the entrants' campaigns. A national strategy is still implemented locally, however, in the depth of promotions, the tiers pushed, and the retention offers made, so average prices can differ across markets even when the announced policy does not. Furthermore, to the extent that any part of an operator's response was applied nationally, markets the FWA providers had not yet reached would also have received some of the price reduction. This would narrow the measured gap in price changes between entered and unentered markets rather than widen it. As a result, the estimated effect of entry would understate the actual impact on prices. The Econometric Appendix takes this up in detail to show that national standard pricing is fully consistent with a local price response to entry.³⁹ What no single market's narrative can do, though, is apportion an incumbent's response among the overlapping pressures at work: the carrier profiled here, the other national entrants, and the fiber overbuilders alongside them. That is exactly what the research design of this econometric study is built to do.

6. Spectrum and the Future Reach of These Benefits

Fixed wireless is a spectrum-based business. Apart from some shared-use spectrum utilized in dense urban areas, the service rides on the same licensed mid-band spectrum that carries the carriers' mobile traffic. Each cell site can support only so many home connections before service quality degrades. The carriers therefore manage sign-ups according to local network capacity, offering service where capacity allows and suspending new eligibility when capacity is exhausted. The practical consequence is that, regardless of how much physical infrastructure the carriers build and how efficiently they use spectrum, the amount of licensed spectrum ultimately determines how many households can be offered fixed wireless service.⁴⁰ It therefore also determines how many

communities, and how many people living within them, receive the competitive benefits documented in this report.

That constraint is not a distant prospect. Carriers already close eligibility where local capacity is exhausted. For a household in a market fixed wireless has reached, being turned away means forgoing the lower-priced service, though the price discipline that entry imposed on the local cable operator still reaches its bill. The larger loss falls on markets the carriers have not launched at all for want of capacity, where none of the benefits documented in this report are realized. Spectrum acquired in recent transactions, together with the resumption of federal auctions, has widened the carriers' headroom considerably, and the upper C-band licenses that must be auctioned by July 2027 will widen it further.⁴¹ Headroom, however, is not the same as sufficiency. The number of FWA subscribers has grown rapidly over the period this report examines, mobile data traffic continues to grow on the same networks, and each new block of spectrum is drawn on by both.

The forward-looking question is therefore not whether the auctions now on the calendar will help, but whether the pipeline behind them runs deep enough to keep pace with demand. The 2025 legislation that restored the Commission's auction authority also directed the FCC and NTIA to identify 800 megahertz of spectrum for commercial use. That spectrum identified for future use, which is five times the amount to be allocated by the upcoming upper C-band auction, will be the most important determinant of available fixed wireless capacity in the 2030s.⁴² Spectrum moves slowly from identification to service: bands must be studied, incumbent users relocated or protected, licenses auctioned, and equipment designed, manufactured, and installed. That sequence routinely takes years, if not the better part of a decade, which means the allocation decisions taken over the next few years will set the competitive conditions households face well into the next decade. A pipeline that stalls after the currently scheduled auctions would leave available FWA capacity fixed at roughly its present level at a point when demand for it is still climbing.

What this report contributes to that discussion is a measured price. Each increment of licensed spectrum that carriers convert into fixed wireless capacity extends the competitive benefit documented here to additional communities: lower bills for the cable households that stay with their incumbent, a lower-priced option for those who switch, and in many rural areas a first high-speed offer where no wired provider has built. Where capacity for FWA is unavailable, none of those benefits from entry are realized. The value of additional spectrum is not confined to the subscribers who take fixed wireless service; it extends to the much larger group who never leave cable but pay less because the option exists.

Spectrum serves mobile customers as well as fixed wireless ones, and in any given area newly licensed spectrum may be devoted to mobile service rather than to residential internet access. Furthermore, the effects measured here come from past entry; the impact of future entry in the markets that remain, or of added capacity in markets already entered, may differ from what this report estimates. Regardless of these qualifications, however, it remains the case that spectrum scarcity constrains fixed wireless, whether that constraint binds today or in the near future. Additional licensed spectrum therefore has the potential to relax that constraint precisely in the markets where fixed wireless can provide the greatest competitive benefit.

7. Implications

For consumers

The most striking feature of the findings is who benefits. The largest group of beneficiaries of fixed wireless entry may not be the fixed wireless customers, but instead the far larger population of cable households that never switched. Households in the latter group paid lower bills because a credible alternative for home internet appeared: roughly \$11 per month on a typical standalone plan. FWA entry saved consumers in the 2023-entry markets about \$776 million in the first year alone and approximately \$1.8 billion by the end of 2025. Across the full fixed wireless footprint over 2023 through 2025, cable households would have saved about \$8.4 billion even if the price effect was only half as large in other markets. If the price effect was the same size in all entered markets, they saved roughly \$15.5 billion, and if it grew over time, they saved about \$20.8 billion. Households that switched from cable to fixed wireless reveal by their choice that they found a better option, and they saved an estimated \$4.6 billion to \$7.8 billion across the four scenarios against what comparable cable service would have cost them. In three of the four scenarios examined, cable households altogether saved even more than households that switched to fixed wireless.

Furthermore, all households in entered markets gained from the non-price responses that competition prompted, including price locks, fee transparency, and contract-free terms. Competition, in short supply in many broadband markets for years, is doing here what it is supposed to do: lowering prices and improving the overall value and terms of broadband service through market competition, without any heavy-handed regulation.

For competitive dynamics in broadband markets

The results demonstrate that competition across technologies works. A technology holding roughly 3.6 percent of fixed broadband connections nationally moved incumbent prices by about 12 percent in the markets it did enter. This is exactly the kind of outsized effect that economic theory predicts when an entrant is credible enough that incumbents respond to the threat of switching rather than waiting for losses to accumulate.⁴³ The response has also reshaped the incumbents' product offerings: price guarantees, simplified pricing with no additional fees, and faster entry-level tiers are now common features of cable offers, and those changes are unlikely to be reversed quickly even where fixed wireless capacity fills up. Neither the improved terms nor the lower prices required new technology or new investment. Both were likely commercially feasible throughout the years when most of their customers had no comparable alternative, but both arrived only after fixed wireless provided one. Any assessments of broadband competition that judge fixed wireless by its market share alone will systematically understate its competitive significance.

For expanding broadband access

The same networks that discipline prices inside cable's footprint extend beyond it, as Figures 2 and 3 showed. In locations not served by a cable operator, fixed wireless is frequently the first high-speed offer a household receives, and the low incremental cost of adding subscribers to existing

towers with sufficient capacity makes the technology well suited to places too thinly settled to attract wired networks. Wireless entry need not be viewed as a permanent substitute for fiber construction in all unserved areas, but it delivers service immediately, at consumer-friendly prices, while construction proceeds. It will likely remain the economical option in some places for the foreseeable future.

For policy

The findings do not determine the appropriate policy outcome by themselves, but they identify several considerations relevant to policymakers. First, while there are many potential claimants for any particular block of spectrum, allocating spectrum for licensed use can protect consumers by enabling additional broadband competition. Keeping the current auction schedule on track and identifying new spectrum for commercial use are the most direct levers for extending the price effects documented here to more communities. Second, analyses of broadband competition, whether in merger review, the FCC's mandated competition reports, or states' broadband planning, should treat fixed wireless as a full competitor whose effect on prices is disproportionate to its market share. Third, broadband subsidy programs, whether they support carriers or consumers, should remain open to any technology that meets the relevant service standards. Program rules for supply-side subsidies should recognize that a market covered by fixed wireless may already be a competitive market. Finally, it bears noting what produced these consumer savings: entry, not rate regulation. Policies that lower barriers to entry, including making spectrum available and streamlining infrastructure siting, can deliver measurable consumer benefits without the costs and distortions of price regulation.

Fixed wireless is a relatively young technology, and the effects measured in this report are its effects in the middle years of deployment, observed after the initial years of entry but still while the carriers were building coverage and capacity. As the spectrum pipeline refills and fixed wireless reaches deeper into the market, the evidence presented here suggests that the dividends to consumers of lower prices, better terms, and wider access will extend to more households.

About the Author

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Endnotes

¹ See PC Mag (2018), <https://www.pcmag.com/news/verizon-rolling-out-home-5g-service-to-4-us-cities-on-oct-1>; T-Mobile (2021), <https://www.t-mobile.com/news/un-carrier/t-mobiles-next-un-carrier-move-5gforall>; and Fierce Network (2023), <https://www.fierce-network.com/wireless/att-expands-internet-air-home-fwa-service>.

² In dense urban areas, carriers also use LBRS (Licensed By-Rule Spectrum) to supplement their fully licensed spectrum holdings to deliver 5G home internet. LBRS is a regulatory framework from the FCC allowing operators to use shared spectrum without an individual license.

³ T-Mobile 4th quarter 2025 earnings release, available at https://s29.q4cdn.com/310188824/-files/doc_financials/2025/q4/Q4-2025-Earnings-Release.pdf; Fierce Network (2026), <https://www.fierce-network.com/broadband/att-hits-2-million-fwa-subscribers-minimal-marketing>.

⁴ FCC, Internet Access Services report (status as of June 30, 2025), author's analysis of data in Figure 30.

⁵ FCC statistics do not report fixed wireless connections by cellular generation (in particular, 5G versus earlier generations). However, the 100/20 Mbps speed threshold is broadly consistent with 5G fixed wireless capability.

⁶ Data on broadband serviceable locations used in FCC statistics are not available to the public. Accordingly, for all author-created coverage statistics (e.g., those in Figure 1 and Figure 2), the set of locations for the denominator is composed of locations that could be covered by 5G FWA, cable, or fiber residential service (as determined from the FCC BDC data).

⁷ FCC, Internet Access Services report (status as of June 30, 2025), Figure 8. The denominator for this statistic is not limited to locations served by any of cable, fiber, or fixed wireless broadband at 100/20 Mbps.

⁸ While these figures depend on the denominator allowed by the public FCC BDC data (households served by any of cable, fiber, or fixed wireless broadband at 100/20 Mbps), they are not far from the FCC's own similar statistic for all broadband-serviceable locations: FWA at 100/20 Mbps (any provider) extends the footprint of other terrestrial

fixed options (cable, fiber, and DSL) by 3.5 percent in June 2025. See FCC, Internet Access Services report (status as of June 30, 2025), Figure 8.

⁹ FCC, 2026 Section 706 Report (August 13, 2026), Figure 1. See the difference between availability in rural areas for fixed terrestrial service (86.7 percent) and fixed wireline services (75.3 percent). The difference between the two is FWA.

¹⁰ FCC, Internet Access Services report (status as of June 30, 2025), Figure 30. Cable's share of residential connections meeting the 100/20 Mbps standard is 57 percent. As can be seen from Figure 4 above, cable's share of all connections (business and residential) is similar.

¹¹ FCC BDC data, analyzed by the author.

¹² For the impact of potential competition on incumbents' behavior in broadband and other markets, see Geroski (1995), "What Do We Know About Entry?" *International Journal of Industrial Organization* 13(4): 421–440; Prieger and Hu (2008), "Competition in Broadband Provision and the Digital Divide," in *Handbook of Research on Global Diffusion of Broadband Data Transmission*, Vol. 1 (IGI Global), 241–259; and Goolsbee and Syverson (2008), "How Do Incumbents Respond to the Threat of Entry? Evidence from the Major Airlines," *Quarterly Journal of Economics* 123(4): 1611–1633.

¹³ Recon Analytics describes the Consumer Wireless & Internet Pulse as the largest and most current syndicated wireless and home-internet dataset available, comprising some two million telecom surveys since 2022. Prices from 231,109 cable-subscribing households were provided to CTIA in aggregated form that preserves the anonymity of respondents.

¹⁴ U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers, Series CUUR0000SEEE03, *Internet services and electronic information providers*. Figures mentioned pertain to the monthly 12-month percentage change in the series (5.0% in May 2024 and -3.1% in May 2025).

¹⁵ The Econometric Appendix details the sample construction, the estimation approach for staggered entry, and all supporting analyses.

¹⁶ The Consumer Savings Appendix explains how the total savings, including those for cable customers in areas not covered by the econometric estimates and those for FWA customers, were computed, as well as the assumptions on which each scenario rests. It sets out the household counts, the subscription and take rates behind them, the basis on which FWA subscribers' savings are valued, and the four scenarios that bracket how far the estimated price effect is carried beyond the markets that identify it. The totals reported for the scenarios should be read as a range of illustrative magnitudes rather than as measures of the change in consumer welfare. The latter would also include the surplus captured by households that switched (i.e., the consumer benefits net of expenditure) and the value of the non-price terms that entry brought.

¹⁷ Statistical significance is only one component of evaluating empirical evidence. The reliability of the result also depends on the accuracy and completeness of the underlying data, the appropriateness of the statistical model and assumptions used, and the extent to which the estimated relationship can be interpreted causally. These issues are discussed in the Econometric Appendix.

¹⁸ See the Consumer Savings Appendix for full details.

¹⁹ As discussed above, 17 percent is the estimated price effect in the second period after entry. Scenario 4 is thus conservative by not applying the increase until the third period after entry. For markets already served when the price data begin, entry under Scenario 4 is treated as having occurred in 2022H2, since the exact date is unknown if it is earlier. The larger effect therefore applies from 2024H1, the third half-year after that assumed entry.

²⁰ The estimated savings for switching households capture only the price gap. The change in consumer surplus is the difference between what the household gains from the FWA plan it chose (i.e., the total economic benefits less the subscription cost) and what it would have gained from its best option absent entry, which also reflects differences in latency, reliability and contract terms.

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²² "Comcast to Raise Cable TV and Internet Prices," The Philadelphia Inquirer, Dec. 1, 2021; Bob Fernandez, "Comcast Rate Increase: Internet, Broadcast TV, and Sports Fees Going Up," The Philadelphia Inquirer, Dec. 5, 2022.

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³¹ While Nevada Bell (later acquired by SBC and today d/b/a AT&T Nevada) operated in Reno and surrounding areas in the north of the state, Las Vegas was historically served by Centel, later acquired by CenturyLink and subsequently rebranded as Lumen.

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³⁵ Fierce Network (2026), <https://www.fierce-network.com/broadband/att-hits-2-million-fwa-subscribers-minimal-marketing>.

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⁴³ See endnote 12.