

Smartphones and Home Broadband Subscriptions: Substitutes, Complements, or Something Else?

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NOTE: The views expressed in this paper are those of the author and not those of the Pew Research Center.

Introduction

In the latter part of the last decade, many policymakers and other stakeholders thought the United States was in the midst of a broadband crisis. Some [were concerned](#) that truly high-speed networks (wireless or wireline) were not extensively deployed in the United States. Others worried about uptake. Notwithstanding fast adoption of home (almost entirely) wireline broadband service in America, [broadband adoption in other countries](#) was higher by some measures than the United States. An additional dimension of the uptake problem was the digital divide, that is, the notion that those without home broadband connectivity experience negative social or economic consequences due to lack of home internet access.

By the middle of the 21st century's second decade, innovation in wireless internet access had changed the nature of the tech adoption problem. Fast fourth generation wireless networks and the rapid adoption of smartphones have given Americans a new way to go online and presented people with choice that few imagined a decade ago. One can subscribe to a traditional wireline broadband service using cable, fiber, or DSL technology. Or one can subscribe to a wireless 4G service at access speeds comparable to those available from wireline a decade ago. And, of course, people can (and do) subscribe to both; some 59% do according to the latest Pew Research Center data.

Having more choice for getting online at broadband speeds has two consequences for policymakers. First, in competition policy, wireless internet access from telecommunications carriers might serve as a meaningful check on market power for the provision of home broadband service from wireline internet service providers (ISPs). Abiding concerns, such as those voiced by Federal Communications Commission Chairman [Tom Wheeler](#), that not enough households have more than one wireline ISP offering next generation speeds underscores the stakes in competition policy. Second, the wireless option may address the digital divide if those without wireline home broadband service take advantage of wireless to get online.

Yet the consequences of choice in internet access depend on how people exercise it. In this paper, the goal is to dig into research that has examined patterns of online access since the advent of the smartphone revolution. It will also focus not just on access patterns, but usage as well. The paper's analysis will explore whether online usage varies depending on home wireline broadband access, smartphone-only access, or access to both kinds of access tools. Understanding possible differences in usage across access modes should be relevant to policymakers interested in both competition and equity.

I. What do analysts say about wireline-wireless substitution?

A mixture of anecdote and theoretical holding-forth tends to characterize some of the discussion of whether wireless is a substitute for wireline broadband access. The [Free State Foundation](#) offers one example, in declaring that, in the face of growing numbers of “smartphone only” individuals, the FCC should recognize that mobile broadband and fixed broadband are substitutes and that an already competitive broadband market is only more so. From a very different perspective, Harvard’s [Susan Crawford](#) looks at the same numbers and draws the opposite conclusion, saying the market for high-end service is not competitive.

Another perspective sees substitution not being a universal pattern, but one relevant to certain demographic segments. Minorities – specifically African Americans and Hispanics – have lower rates of home broadband subscriptions and higher rates of smartphone only adoption, as do low-income households. Given this, smartphones are a substitute for wireline access mainly for these demographic groups.

A more dynamic view of the matter does not see 4G wireless as a substitute for wireline broadband today, but notes the real potential that 5G will have the capacity to be a substitute for wireline service. This view argues further that realizing the potential of 5G will require [extensive investment in wireline infrastructure](#). As to industry, whose views may be shaped by advocacy positions on competition policy, wireless access is [generally portrayed as a competitive threat](#) to wireline service offerings.

A more nuanced perspective wisely suggests that the question of wireless/wireline substitutability must be “put to the consumer.” In a discussion on that, [Leslie Marx](#) suggests that speed may not be the most important attribute consumers examine in the wireless-wireline choice. She notes a European Commission report that says that about 25% of those with access to next generation access networks are not interested in additional speed. From this, she infers that such consumers, seemingly indifferent to speed, may see 4G networks as viable alternatives to wireline networks.

The remainder of this paper aims to “put to the consumer” the issue of wireline versus wireless substitutability by examining data on patterns of adoption and usage of wireless and wireline access services. This will entail a review of research studies which have examined this question, as well as data and findings from the Pew Research Center.

II. Review of recent studies

Surveys of consumers are the hallmark of research that explores wireline versus wireless choices and different surveys have different objectives. In 2013, researchers with Connected Nation combined data from that organization's surveys across a number of different U.S. states in [Smartphones as a Substitute – Why Some Smartphone Users Aren't Subscribing at Home](#). This research uses a multinomial regression model to pick apart the demographic factors that are associated with smartphone-only users. With the ability to control for a range of socio-economic and demographic characteristics, the analysis found that younger respondents, lower-income respondents, African Americans, rural residents, and households without children all were significantly more likely to be smartphone only. Notably, given the common understanding from cross-tabulations that Hispanics are more likely to be smartphone-only, the Connected Nation research finds that this is really a youth effect. That is, since Hispanics are on average much younger than the rest of the population and because young adults are more likely to be smartphone-only, Hispanics' high smartphone-only incidence is a result of their youthful profile.

Mossberger, et.al. (2012) focus on usage patterns for smartphone-only individuals compared to those with home broadband in [Measuring Digital Citizenship: Mobile Access and Broadband](#). For an urban population – the Mossberger survey gathered data from 3,000 residents of Chicago – the analysis shows that, across a range of online activities, smartphone-only respondents generally show lower levels of incidence. For using the internet for community news, visiting a local government website, using the internet for work, and searching for the internet for health information, and more, smartphone-only users trailed home broadband subscribers by about 10 percentage points. The only exception to this pattern was using the internet to look for or apply for a job; there smartphone-only respondents were more likely than broadband subscribers to do that by a margin of 83% to 60%. The paper also found that smartphone-only respondents have lower levels of digital skills than those with broadband at home.

Beyond looking at demographics and behavior, another way to investigate the substitution issue is through attitudes. Would people give up their broadband connection for a smartphone? Do people prefer different modes of access for different kinds of online activities? In a 2014 survey for "[Smartphones and Broadband: Tech users see them as complements and very few would give up their home broadband subscription in favor of their smartphone](#)," Horrigan looks at internet users' responses to questions about preferences for connectivity. The paper found that:

- Very few broadband users would be willing to cancel their home broadband connection in favor of their smartphone for online access. Some 63% said they would be very unlikely to do this and another 29% said they would be somewhat unlikely to do this – or 92% overall unwilling to cancel broadband in favor of smartphone-only.

- A home broadband connection is the preferred means for information searches, shopping, and watching video, while the smartphone is the preferred means for communicating with family or friends. Specifically:
 - 89% agree very (63%) or somewhat (26%) strongly that their computer, using their home broadband connection, is their preferred means for looking for information about health care or for school work.
 - 83% agree very (56%) or somewhat (29%) strongly that they prefer to use their computer for shopping.
 - 78% agree very (43%) or somewhat (35%) strongly that the smartphone is their preferred way to get hold of a family or friend.
 - Just 29% agree very (11%) or somewhat (28%) strongly that the smartphone is the preferred device for watching online video.

Additionally, 55% of smartphone users report having a data cap and, among them, half (52%) report waiting until they are within range of Wi-Fi to do certain activities or that they avoid certain data-intensive activities such as video.

III. Studies from the Pew Research Center

In a series of studies, the Pew Research Center has investigated smartphone adoption patterns and how people experience the internet using a smartphone. In 2014, the Pew Research Center undertook an extensive examination of the smartphone adoption patterns. The "[U.S. Smartphone Use in 2015](#)" report finds that 19% of Americans are smartphone-dependent, which includes people who are either smartphone-only (10% of the adult population) or have some sort of access beyond just a smartphone but the access is limited to such an extent that they use their smartphones mainly for access (15% of all adults). Some 7% of Americans say both conditions apply to them. Like the Connected Nation report, Pew finds that the "smartphone dependent" are younger, lower-income, and more likely to be African American or Latinos.

The Pew analysis also contrasts the "smartphone dependent" with smartphone owners with multiple access paths. Clear differences emerge along economic lines.

- The "smartphone dependent" are more than twice as likely as other smartphone users to say they have had to cancel or suspend service due to financial constraints – by a 48% to 21% margin.
- The "smartphone dependent" also run up against data caps more often than other smartphone users (most of whom presumably have wireless networks from their home broadband network). Half (51%) of the "smartphone dependent" say this compared with 35% for other smartphone users.

Other Pew findings underscore difficulties that smartphone users have when trying to carry out certain tasks online. The 2015 report "[Searching for Work in the Digital Era](#)" looks at how people use digital resources in job search. Overall, 79% of Americans who have looked for work in the past two years have used digital tools to do so, with 34% saying it was the most important tool they used. Additionally, 28% of adults have used a smartphone as part of their search and half of those have filled out a job application using a smartphone. Yet, the 28% of Americans who use the smartphone for job search do encounter problems with using the smartphone for this purpose. Among this 28%:

- 47% said job search content did not properly display on their device
- 47% said they had trouble with content not optimized for a mobile device
- 38% reported having difficulty entering large amount of text on their smartphone
- 37% had problems submitting required files or documents to a job search site.

With some of the difficulties and constraints that smartphone-only individuals experience, it is no surprise that they sometimes have to engage in "workarounds" to find the access they need. Often this involves the local public library. For public library users, those with smartphones only are more likely to use a library's Wi-Fi, computers, or internet connections to get online – by a 34% to 26% margin in comparison to those with home broadband. Similarly, for those who engage in [personal learning](#) activities, the smartphone-only are more likely to do this at the library than those with broadband at home (by a 26% to 22% margin). They are also less likely than home broadband users to pursue this learning online (by a 47% to 59% margin).

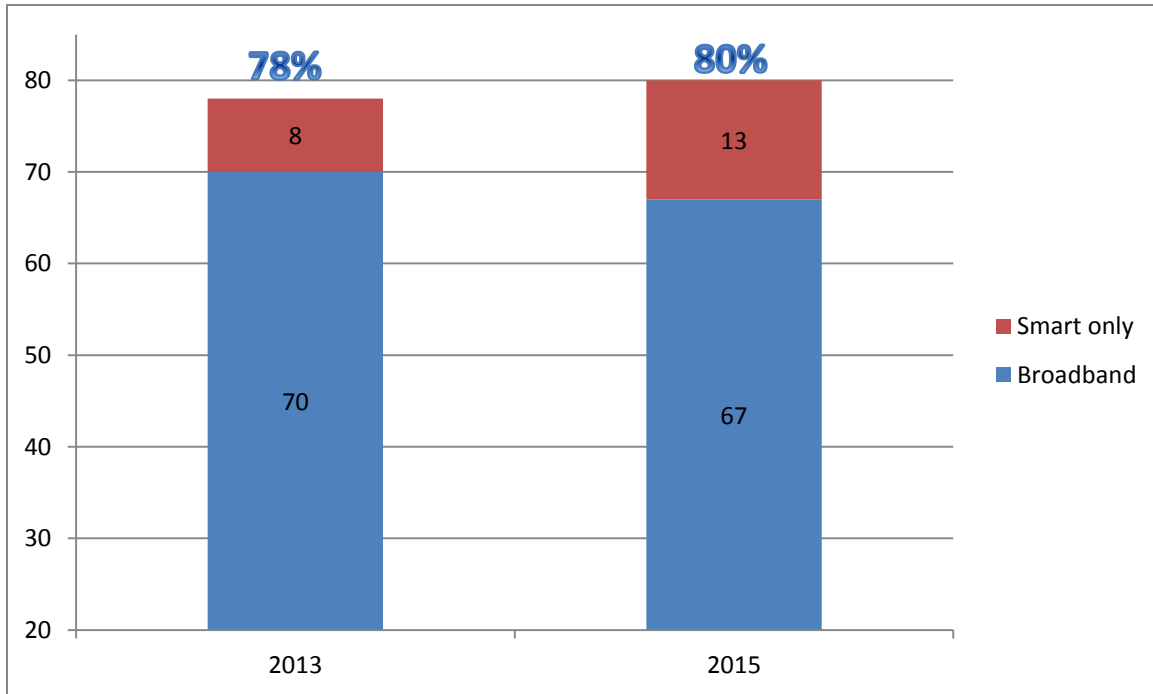
Another perspective on the role of smartphones comes from looking at how people use technology to pursue lifelong learning. In "[Lifelong Learning and Technology](#)," Pew found that 74% of adults who engaged in personal learning activities in the prior year, such as attending book club meetings, conferences, conventions, or taking course. Among the 74% who did one of those learning activities (when asked what means they used when learning took place at home):

- 69% say they did this learning on a laptop or desktop computer;
- 11% say they used their smartphone, and;
- 9% cite a tablet computer.

Finally, Pew's "[Home Broadband 2015](#)" report analyzes the changing composition of online access, introduces the notion of "advanced internet access," and explores reasons why people do not have broadband – with particular focus on the role of smartphones. With respect to the changing composition of access, the report finds that over the 2013 to 2015 time frame, advanced internet access, that is, those *either* with a home broadband subscription *or* a smartphone, increased slightly from 78% to 80%. Within that, though, the share of those with

broadband at home dropped from 70% to 67% while smartphone-only adoption increased from 8% to 13%.

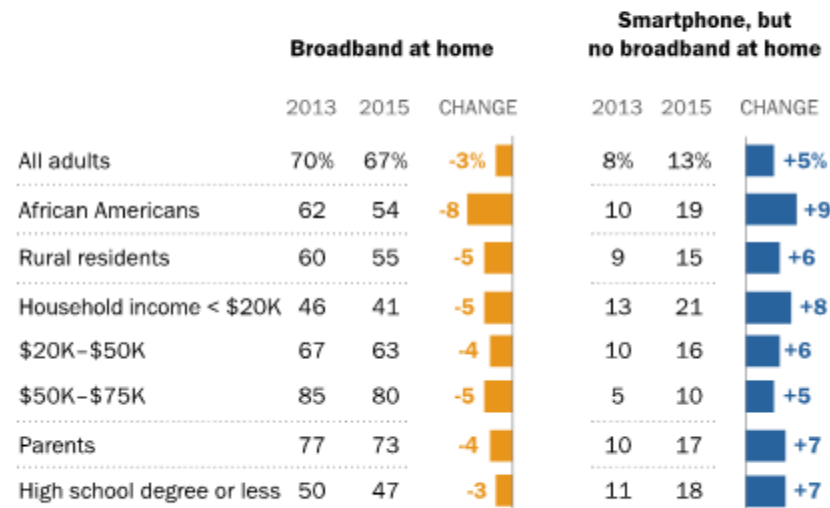
Advanced internet access



Importantly, the drop in home broadband and the rise in smartphone-only adoption mirrored one another. African Americans, rural residents, and low and lower-middle income Americans showed above average declines in home broadband adoption and above-average increases in smartphones only as their online access means.

Several groups are shifting their home internet connectivity away from broadband and toward smartphones

% of each group who have ...



Source: Pew Research Center surveys

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The upshot at looking at adoption patterns in this way is that, even if the drop in the traditional metric of access (broadband subscriptions at home) may alarm some, smartphones steadies the ship, with the uptick in advanced internet access grows from 2013 to 2015.

But how does the utility of the smartphone fare for those without broadband? For some, the smartphone suits them fine. The Pew survey explored this by asking about reasons people do not have broadband in a two-step process. First, non-users were asked to identify from a list of reasons why they do not have service at home. Second, having had the chance to choose more than one reason, non-users were asked to state the most important reason they do not subscribe to broadband. Here are the results:

Non-broadband users cite a number of barriers to adoption

% in each group who cite the following as reasons for not having broadband at home

	All non-broadband users	Smart-phone only
The monthly cost of a home broadband subscription is too expensive	59%	58%
You have other options for internet access outside of your home	46	59
The cost of a computer is too expensive	45	41
Your smartphone lets you do everything online that you need to do	27	65
Some other reason I haven't already mentioned	25	20
Broadband service is not available where you live, or is not available at an acceptable speed	23	27

Cost is the most important barrier to adopting broadband

% of non-broadband users who cite these as the most important reasons for not having a broadband connection

	All non-broadband users	Smart-phone only
The monthly cost of a home broadband subscription is too expensive	33%	33%
Your smartphone lets you do everything online that you need to do	12	29
You have other options for internet access outside of your home	10	9
The cost of a computer is too expensive	10	5
Some other reason I haven't already mentioned/no reason given	25	14
Broadband service is not available where you live, or is not available at an acceptable speed	5	6

As the table shows, there is a segment of non-broadband users that see the smartphone as sufficient to their digital access needs. Among smartphone-using non-broadband adopters (that is 42% of all non-broadband users), close to two-thirds say the smartphone lets them do all they

need to online, though a smaller share (under one-third) cite it as the most important reason they do not have service. That puts a lower limit of the number of non-broadband users who view the smartphone as a substitute for home high-speed service at one-third of all non-broadband users and an upper limit at two-thirds of all non-adopters. Splitting the difference, let's say half of all non-broadband users see the smartphone as a substitute for a home high-speed connection.

Doing the math (with 33% of Americans lacking a home broadband connection, with 42% of them having a smartphone, and roughly half of those viewing smartphones as a substitute for broadband) yields a finding that 7% of all American adults see their smartphone as a substitute for a home broadband connection. That amounts to roughly 1 in 10 smartphone users.

Another finding from the Pew report to introduce is how people viewed the importance of a home broadband subscription over the 2010 to 2015 time interval. In 2010, Pew asked people whether not having broadband at home was a major disadvantage or a minor disadvantage in areas such as finding a job, accessing government services, getting health information, and more. In 56% of Americans said lacking broadband at home was a major disadvantage across different topic areas, a figure that grew to 69% in 2015.

Importantly, those figures on the value people place on having broadband at home grew more steeply for non-broadband users. Less than half (48%) of non-adopters said lacking broadband at home was a major disadvantage in 2010, but nearly two-thirds (65%) said this in 2015. Among that 65% of non-adopters, the monthly cost of service was cited by 38% as the most important reason they lacked service – compared to 24% of remaining non-adopters who cited cost as the most important reason they do not have broadband.

In sum, the Pew data on broadband adoption in 2015 paint a picture where smartphones are clearly filling important access gaps for those without a home broadband subscription plan. For many of non-broadband users with a smartphone plan, the smartphone is adequate for their needs (and a majority says they have alternative internet access outside the home). Yet they clearly see the value of a home broadband connection and, if affordability were not a barrier, a good many would likely get high-speed service at home.

IV. Personal information processing

Although most digital divide discourse often centers on access gaps, access is not an end in itself. It is a means to living in an information society where people seek to (and often essentially are *required to*) carry out tasks online. There are obvious upsides to this – the ease of using the internet to communicate with friends or colleagues or the benefits of finding a bargain online. There are also potential downsides; people may experience information stresses, such as information overload or have difficulty finding the information they need.

To explore this, the Pew Research Center’s April 2016 survey asked a nationally representative sample of adults about eight different types of information searches they might have done in the prior month. The question was framed to explore information needs on issues of consequence in their lives. The role of the internet in meeting those information needs was not the thrust of the questioning. Yet, as the table below shows, those with more tools with which to access digital resources had greater rates of information searches.

In the past month, have you searched for information about:			
	All	Broadband, smartphone, AND tablet computer	Smartphone only
Community news and information	66%	75%	54%
Health care or health insurance,	41	45	29
Schools or education	39	48	34
Traffic or commuting	34	46	24
Personal finances	32	44	19
Government services or benefits	28	30	26
Issues pertaining to your job	28	40	23
Local home repair	19	21	16
Average number of searches	2.87	3.50	2.26

Those with personal tech abundance – the 39% of adults that have a home broadband connection, a smartphone, and a tablet computer – do more information searches than the 13% of adults who are smartphone-only. Now, some of the difference may be attributable to demographics and differences in information needs. At the same time, multivariate analysis

shows that the difference in information searching between the two groups is, to a significant extent, associated with online access tools.

When it comes to “information stresses,” differences also emerge between those with lots of digital resources and those with only one.

Information stresses

	All	Broadband, smartphone AND tablet computer	Smartphone only
Feel stressed about the information I must keep track of	42%	37%	43%
It is sometimes difficult for me to find the information I need	36	24	49
Feel overloaded by information	20	14	21

Information overload is not much of a problem for people, but somewhat more of an issue for people with a smartphone only. There is a moderate amount of stress associated with keeping track of information flows for all adults and those with a smartphone feel this a bit more than those with lots of options for getting online.

The big difference emerges in looking at the ease of finding information. Smartphone-only adults are twice as likely to have difficulty in finding information as those with each of three tools for digital access. If you have personal tech abundance, it is typically not hard to find the information you need; if you only have a smartphone there is a 50-50 chance you have trouble from time to time.

V. Smartphones and Communications Policy

Smartphones fill a crucial access hole for some segments of the population, but the evidence assembled here suggests that they are not a robust substitute for a wireline broadband subscription. Few (about one in ten) smartphone-owning Americans indicate that the smartphone is a substitute for a home broadband connection. Not many broadband users would consider doing away with a broadband connection in favor of their smartphone. A strong majority (nearly two-thirds of non-adopters) say that lacking broadband at home is a major disadvantage and, for them, cost looms large as a reason they do not subscribe. For the remaining set of non-adopters, the monthly fee for access recedes as a reason; digital skills and not understanding the relevance of having service are key factors for this group.

The other key point is the user experience for those with smartphones as their lone personal tool for online access. Relative to smartphone users with multiple access pathways, the smartphone-only are more likely to experience service interruptions or to run into data cap constraints. They also do a narrower scope of online activities than those with broadband and encounter problems associated with a small screen. Smartphone-only users are generally less likely to engage in information searches that have consequences for their lives. Finally, the smartphone-only encounter significant difficulties in finding the information they need.

For those interested in the **digital divide**, the message is clear, with a dash of nuance:

- The smartphone is not a substitute for home wireline broadband for half of non-adopters.
- Smartphone users who see their wireless access as a reasonable substitute participate in a “workaround” ecosystem for carrying out online tasks. They cope with data caps and seek out access options outside the home. Since cost rivals the utility of the smartphone as a reason they do not have a broadband subscription, many smartphone-only users might purchase service with the right plan.

For **industry**, the findings on smartphone use are important in the context of the market for broadband service reaching saturation or possibly contracting. Two possible implications for industry are:

- More price discrimination
- More policy scrutiny

With declines in home broadband adoption most acute for low to lower-middle income households, ISPs may consider tailoring offerings to such households. This has already happened with programs such as [Internet Essentials](#) from Comcast and [AT&T's \\$10 per month](#)

[broadband](#) offer for qualifying low-income households, although there is [evidence](#) that consumers are not always aware of these plans. Such price discrimination may garner more subscribers, but would also come with less revenue per user in a portion of the market expensive to serve because of higher churn rates.

Another consequence of flattening adoption pertains to investment in next generation networks. A market with home adoption stalled at 70% means a smaller user base from which to recoup the cost of upgrading or building expensive new high speed networks. If the result is lower investment levels and a lock-in of current market structure, policymakers might take note. Antitrust scrutiny is possible if policymakers worry that there are too few providers of very high speed service in too many locales. Regulatory remedies seem both out of fashion and politically infeasible, but topics such as rate regulation might nonetheless take on new prominence in policy discourse. Calls for municipal broadband – the notion that cities should build fiber networks – may also grow louder.

Innovation has not solved the digital divide for non-broadband homes. At best, it has offered some users a bridge to a workaround ecosystem that gives them access to online resources, with the attendant hassles of data caps and small screen constraints. If smartphones continue to contribute to flat home broadband adoption rates, policy debates about the digital divide may begin to intersect more prominently with competition policy.