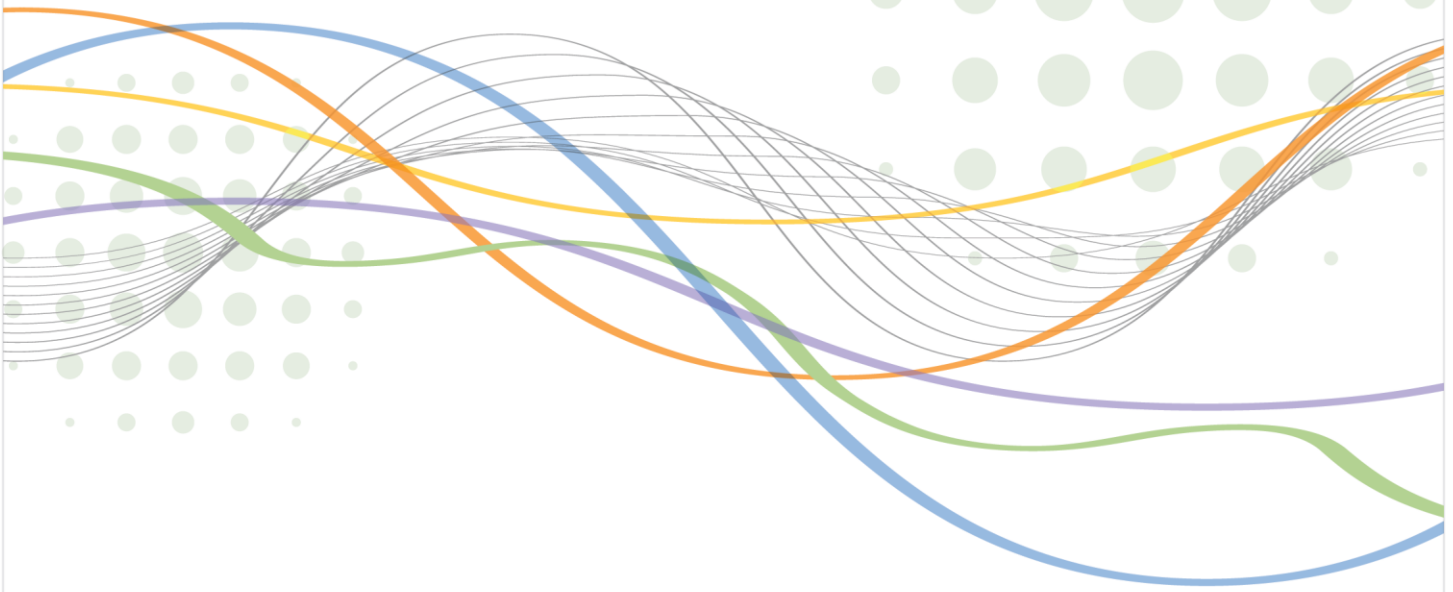


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U.S. BROADBAND INVESTMENT REBOUNDED IN 2017

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USTELECOM

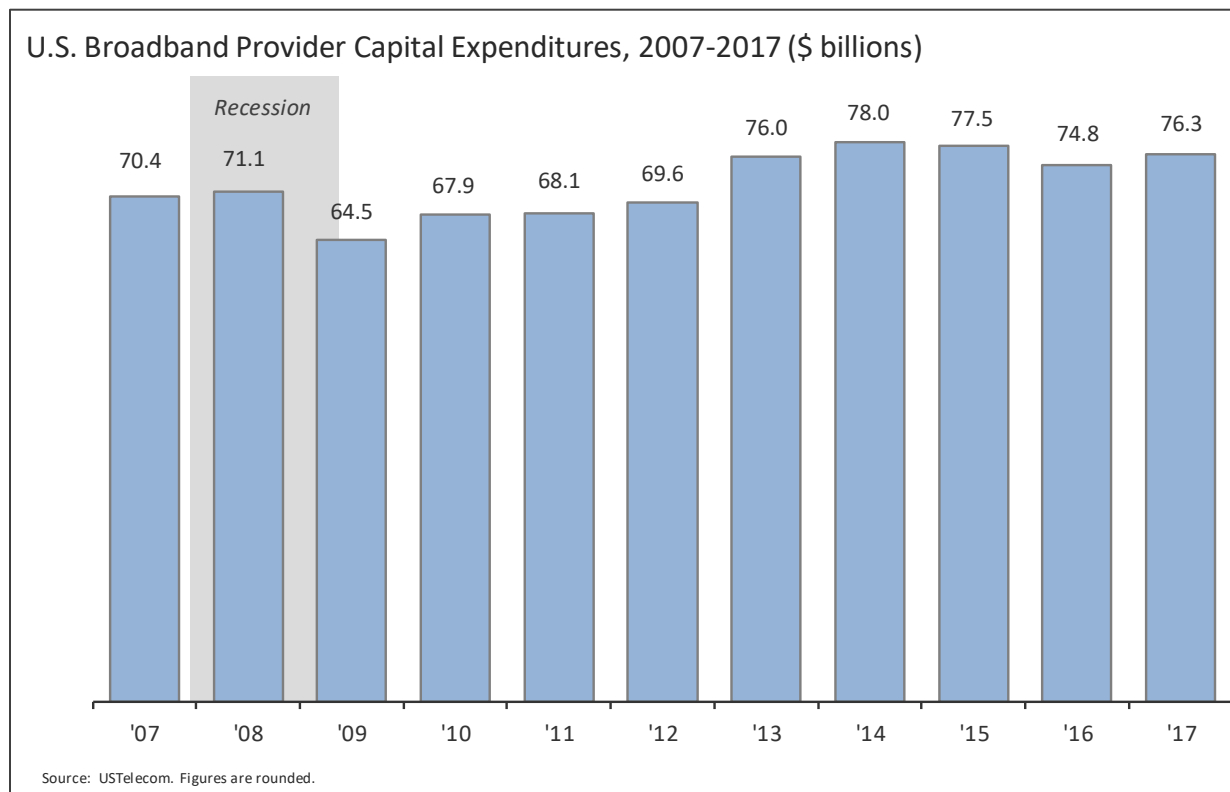
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Summary

U.S. broadband providers invested approximately \$76.3 billion in network infrastructure in 2017, up from approximately \$74.8 billion in 2016 according to a new USTelecom analysis of company capital expenditures data (see Chart 1). USTelecom has published its broadband provider capital expenditures data series annually for the last eight years. The data now cover 22 years of broadband provider capital investment. This data release includes historical revisions to incorporate new information. From 1996 through 2017, the broadband industry has made capital investments totaling more than \$1.6 trillion (see Chart 2).

Chart 1



USTelecom’s data, which include historical revisions, show that the decline in broadband providers’ capital expenditures started in 2015, accelerated in 2016, and returned to growth in 2017. The data indicate that annual industry capital expenditures fell – for the first time following the 2008-9 recession – by approximately a half billion dollars in 2015, and by another \$2.7 billion in 2016. In all, by 2016, annual capital spending by broadband providers was \$3.2 billion lower than it was in 2014. In 2017, broadband provider capital spending rebounded by \$1.5 billion compared to 2016.

The start of the broadband capital investment decline in 2015 coincided with a Federal Communications Commission (FCC) decision to reclassify broadband providers as common carriers under Title II of the Communications Act. USTelecom has consistently stated that the relevant question with respect to the impact of Title II on investment is what investment would have been over the long term under different regulatory

scenarios, holding other factors constant. Relevant factors might include, for example, competition, financial markets, taxes, government mandates, product cycles, project timelines, regulation, and company-specific factors. USTelecom does not attempt in this research brief to isolate and control for the various factors and therefore does not draw conclusions about the extent to which the move to Title II may have caused the decline in capital investment. However, the decline in the series in 2015 and 2016, followed by a return to growth in 2017 when the FCC had indicated its intention to repeal the Title II classification, suggests that expectations regarding common carrier regulation may have been a factor and warrants further investigation and analysis. USTelecom cited previous research efforts to isolate the impact of common-carrier regulation on investment in its [October 31, 2017 research brief](#).

Broadband investment remains critical to modernizing our nation’s network infrastructure, maintaining international leadership, and closing the broadband gaps that exist in rural America. It will be necessary to maintain a policy environment that encourages greater investment, given projected growth in demand for data usage as well as the need to expand networks further into currently unserved areas.

The Cisco Visual Networking Index projected U.S. Internet Protocol traffic to [grow nearly 2.5 times](#) in the five years from 2016 to 2021. Traffic growth will be driven by consumer and business use of streaming media, faster 5G mobile networks, the growing Internet of Things, and cloud-based services. The internet connections and the mobile and data center infrastructures that deliver these services will require constant broadband investment in capacity, speed, and reliability.

While underlying broadband infrastructure, both fixed and wireless, is available to almost all Americans, there remain gaps in portions of rural America. For example, [2017 data](#) from BPI-Telcodata indicate at speeds of 25 megabits per second download and 3 megabits per second upload, 70 percent of rural areas have access compared to 98 percent of non-rural areas. Policies that encourage more investment can help to close these gaps and bring the benefits of cutting-edge broadband service to all American consumers and businesses.

Chart 2

Year	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17
Broadband Provider Capex	55.3	65.3	72.1	91.8	118.1	111.5	72.0	57.0	57.5	62.1	70.1	70.4	71.1	64.5	67.9	68.1	69.6	76.0	78.0	77.5	74.8	76.3

Source: USTelecom

Methodology

USTelecom collected capital expenditures data for wireline telecommunications, wireless telecommunications, and cable broadband providers in order to approximate an industry aggregate. The data exclude other providers, such as satellite providers, telecommunications resellers, and electric utilities. The data are nominal; USTelecom does not adjust for inflation or quality. Figures are rounded. Previous years may include minor revisions.

The majority of telecommunications data come from company financial statements, taking into account business segment reporting, accounting changes, mergers, and spin-offs. The analysis is subject to the reporting practices of individual companies. Capital expenditures may include investment in property, plant, and equipment, capitalized software, capitalized interest during construction, corporate, directory, and other capital expenditures, and intra-company eliminations. USTelecom made reasonable efforts to eliminate double counting, non-U.S. investment, and non-capital spending. USTelecom made estimates for non-reporting companies.

USTelecom also consulted additional market research and government sources for comparison, including the United States Census Annual Capital Expenditures Survey, the Yankee Group Global Capex Forecast 2010, the Skyline Marketing Capex Report 2010, data from the Cellular Telecommunications & Internet Association (CTIA), and New Paradigm Resources Group. Cable data are from the National Cable & Telecommunications Association (NCTA).

Technical Notes

It has been necessary to adjust certain reported capital expenditures starting in 2014 to ensure that the data series remains consistent over time and reflects actual change in the capital stock of the U.S. economy. The data contain additional historical revisions based on new information. The discussion below addresses the adjustments to reported capex and historical revisions in detail. See Chart 3 for a detailed listing of adjustments to the 2016 historical data series issued in this research brief, as well as previous adjustments to USTelecom's 2015 series described in its [October 31, 2017 research brief](#).

Capitalized Wireless Phones

USTelecom excludes certain reported capital expenditures for wireless phones leased to customers. It was necessary to exclude capital expenditures for leased phones because otherwise total company-reported capital expenditures would not provide an apples-to-apples comparison over the course of our time series.

Under accounting rules, Sprint reports wireless phones purchased for leasing to customers as capital expenditures. Sprint's wireless phone leasing program ramped up at an extraordinary pace in 2015 and remained at approximately the same level through 2017. In order to maintain the consistency of the data series for all periods, USTelecom excludes the following amounts that Sprint reports for leased wireless phones in its capital expenditures: \$143 million in 2014, \$2.163 billion in 2015, \$2.098 billion in 2016, and

\$2.182 billion in 2017. Including such capital expenditures for leased phones would skew the data and inflate the perception of growth by \$2 billion from 2014 to 2015. (For a detailed analysis of these changes and their impact on USTelecom's capital expenditures data, see Chart 3).

Wireless Phone Accounting

The traditional business practice among wireless companies has been the subsidized phone sale model, in which the provider purchases phones and sells them to its customers along with a service contract. Typically, the provider sells the phone at a steep discount, say \$200 for a \$600 device, or a \$400 subsidy. The provider and the customer enter into a contract for about two years, in which the customer agrees to pay a certain monthly subscription rate. That rate includes an amount sufficient to cover the cost of service and to pay off the subsidized cost of the phone over the term of the contract.

From an accounting perspective, under the subsidized phone model, the devices purchased by providers go into inventory and the company records them as a cost of equipment sold once the customer takes ownership of the device. Under Sprint's leasing program, since it purchases phones to lease rather than sell to the customer, the devices become an asset of the company, which it records as capital expenditures.

Recently, wireless carriers have employed installment plans instead of either traditional subsidy plans or leasing programs. Under installment plans, consumers also own the devices and payback the cost in installments over time, similar to a loan. There are differences in accounting for subsidy plans and installment plans. For example, under subsidy plans, companies recognize revenue in periodic increments over the term of the contract; under installment plans, companies recognize revenue for the full sale price of the phone up front and collect "receivables" as consumers pay off their "loan." Regardless, like subsidy plans, wireless providers do not report phones sold under installment plans as capital expenditures and therefore they do not affect USTelecom's capital expenditures data series.

Excluding Capitalized Leased Phones Is Appropriate and Necessary

Including leased wireless phones as capital expenditures makes sense from an accounting perspective, but not from an economic perspective. From the perspective of USTelecom's capital expenditures time series, in particular, it is appropriate and necessary to exclude capital expenditures resulting from the shift to phone leasing programs in 2014 and their acceleration in 2015 and thereafter.

First, shifting phones from a cost of goods sold to a capital expenditure on financial statements reflects an accounting change and has no impact on the capital stock of the U.S. economy. The phones appear as capital expenditures merely because leasing phones requires different accounting than selling phones. In any given period, U.S. wireless consumers would have had approximately the same quantity and quality of wireless phones regardless of whether they leased them or purchased them. The capital stock of the U.S. economy attributable to wireless phones in circulation is no different than it would be otherwise because Sprint chose to lease rather than sell some of its phones. This allows, of course, for potential marginal impacts on wireless phone adoption and market share resulting from the availability of less expensive leased phones and shorter commitment periods. But the effects are likely minimal.

Second, USTelecom's capital expenditures series measures *change* over time and it is therefore essential to measure the same thing from one period to the next. It is improper to include the capitalized phones in USTelecom's time series because the capitalization of these phones does not reflect actual growth in the capital stock of the economy, just a shift in where this capital is measured. From the standpoint of the economy as a whole, leased phones are a business asset and sold phones are a consumer asset. One could make a case for measuring all wireless phones, whether they are company assets or consumer durable goods; but that would require measuring all phones in all periods, not just a one-time shift of a subset of phones onto business financial statements due to a new leasing business practice. Including such a subset of leased phones would artificially skew the *change* in capital expenditures reflected in USTelecom's data and would create the false impression of growth from 2014 to 2015. In other words, including the phones would falsely imply that broadband providers' contribution to the national capital stock grew by \$2 billion more in 2015 than it actually did.

Finally, the exclusion of Sprint's leased phones from USTelecom's capital expenditures data is not to single out Sprint nor is it to criticize leasing phones as a business practice. Most other wireless providers do not lease phones. Those who lease phones do not report them as capital expenditures, e.g., T-Mobile's JUMP! On Demand. USTelecom's only objective with excluding Sprint's capitalized wireless phones is to develop a time series that accurately reflects change from one period to the next.

AT&T Reporting Changes and 2016 Revision

In 2015, AT&T revised its financial reporting to reflect the acquisitions of DirecTV and its Mexican wireless business, which occurred near the middle of that year. To develop a consistent time series with appropriate comparisons to prior years, USTelecom excluded estimated capital expenditures for the newly acquired businesses. Based on public information, DirecTV was investing approximately \$3 billion per year at the time of the acquisition. Additionally, in 2015, AT&T stated that it would spend approximately \$3 billion over four years to upgrade its Mexican cellular network. USTelecom estimated at that time that AT&T would spend approximately \$750 million per year on the Mexican wireless upgrades.

For the full year in 2015, AT&T reported capital expenditures, including capitalized interest, of \$20.0 billion. USTelecom backed out approximately \$2 billion for DirecTV and Mexican wireless operations, including estimated capitalized interest, reflecting a half year of operations since the business units were acquired mid-year. Therefore, USTelecom estimated AT&T's 2015 capital expenditures excluding the DirecTV and Mexican wireless units were \$18.0 billion. USTelecom makes no changes to this estimate.

USTelecom is however revising its estimate for AT&T's 2016 capital expenditures. See Chart 3. AT&T reported total 2016 capital expenditures, including capitalized interest, of \$22.4 billion. Since the DirecTV and Mexican wireless units were part of AT&T for the full year in 2016, it was necessary to back out a full year of capital expenditures for these business units plus capitalized interest. For the [initial release](#) of 2016 broadband investment data on October 31, 2017, USTelecom backed out approximately \$4 billion for the DirecTV and Mexican wireless units and estimated that AT&T's remaining 2016 capital expenditures were \$18.5 billion.

In 2018, AT&T publicly reported that it had accelerated the timeframe for its upgrades to the Mexican wireless network, completing the vast majority of the project by 2017. USTelecom assumes that the overall capital

spending associated with the upgrades is constant at \$3 billion and the acceleration occurred in 2016 and 2017. Therefore, USTelecom revises its estimate for Mexican cellular operations in 2016 to \$1.2 billion and backs out an additional \$0.5 billion from AT&T's total 2016 capital expenditures. As a result, USTelecom reduces its estimate for AT&T's 2016 capital expenditures excluding the DirecTV and Mexican wireless units from \$18.5 billion to \$18.0 billion. For 2017, AT&T reported approximately \$21.6 billion in capital expenditures, including capitalized interest. Again, USTelecom must back out a full year of DirecTV and Mexican wireless capital spending plus capitalized interest. Due to subscriber trends affecting equipment purchases, partially offset by a satellite spending, USTelecom assumes DirecTV capital spending declined from approximately \$3 billion per year in 2016 to \$2.5 billion in 2017. Meanwhile USTelecom estimates that the Mexican wireless unit continued to invest at an annual rate of \$1.2 billion in 2017. The resulting estimate for AT&T capital expenditures, excluding DirecTV and Mexican wireless units, is \$17.7 billion in 2017.

USTelecom made an additional adjustment to its AT&T capital expenditures estimates in 2017. For 2015 and 2016, USTelecom had rounded the AT&T estimates for capital expenditures excluding DirecTV and Mexican wireless units to the nearest half billion dollars. For the updated 2017 series, USTelecom rounds to the nearest one hundred million dollars and applies this methodological change retroactively to 2015 and 2016. The methodological change has no impact on the 2015 and 2016 figures since the resulting estimates are the same whether rounded to the nearest \$100 million or nearest \$500 million; but it does result in a more accurate estimate for 2017.

Discontinuance of Wireline and Wireless Breakout and Impact on Historical Series

Starting with the release of 2016 broadband provider capital expenditures series, USTelecom discontinued publishing breakouts of wireline and wireless capital spending. There are several reasons it no longer make sense to report this breakout. First, the line between wireline and wireless investment is blurring as a growing portion of wireline investment supports either dedicated wireless backhaul or transport infrastructure shared by wireline and wireless access networks. Meanwhile, devices increasingly shift between wireless and wireline networks. Second, a major company, AT&T, stopped breaking out wireline and wireless capital expenditures as of the second half of 2015. USTelecom attempted to allocate AT&T's capital expenditures to wireline and wireless for the full-year 2015; but such estimated allocations became increasingly imprecise, with potential for error. Third, another large company, Verizon, reports capital expenditures in categories for wireline, wireless, and "other." USTelecom historically allocated "other" capex between wireline and wireless categories. As Verizon has acquired digital media and other services not fitting into wireless and wireline categories, the "other" category has grown quickly. Allocating Verizon's "other" capital investment to wireline and wireless categories adds to the growing imprecision in these categories. Starting with the 2017 capital expenditures series, USTelecom no longer allocates Verizon's "other" capital expenditures to wireless and wireline categories, but rather maintains a separate "other" category. USTelecom applies this change retroactively to historical data reported by Verizon, but it has no impact on Verizon's total annual capital expenditures included in the series.

Given the blurring of lines between wireline and wireless investment, as well as the disproportionate impact of AT&T and Verizon, which historically have represented approximately two-thirds of wireless capital expenditures and one-half or more of wireline telecom capital expenditures, USTelecom has discontinued separately reporting aggregates of wireless and wireline capital expenditures.

Despite increasing imprecision, USTelecom does continue to track estimates for wireline and wireless capital spending internally. This is because USTelecom historically used these breakouts to estimate capital expenditures for non-reporting wireless providers and incumbent local exchange carriers (ILECs). While breakouts are imprecise, they continue to be the most practical means of estimating certain non-reporting providers' capital expenditures. However, under this method, the removal of Verizon's "other" spending from the wireless and wireline categories resulted in minor revisions to historical estimates for non-reporting wireless companies. See Chart 3. There was no impact on historical estimates for non-reporting ILECs.

Independent Competitive Provider Mergers and Historical Revisions

USTelecom must estimate capital expenditures for the independent competitive provider industry because many of these providers are private companies that do not disclose financial data. The competitive provider industry has undergone significant mergers in 2017: CenturyLink-Level 3; Crown Castle-Lighttower; Verizon-XO; Windstream-Earthlink and Broadview; and Zayo-Electric Lightwave. In some cases, USTelecom was able to replace estimates for selected private providers with actual historical data filed with the Securities and Exchange Commission by acquiring public companies. Therefore, USTelecom makes minor revisions to historical estimates for independent competitive providers. See Chart 3. After historical revisions, USTelecom estimates independent competitive providers capital expenditures were \$5.2 billion in 2016 and \$4.6 billion for 2017. For both years, these figures exclude Broadview, Earthlink, Level 3, XO, and former cable over-builders such as WOW and RCN, since USTelecom accounts for these companies in separate line items.

Elimination of CyrusOne from Historical Data Series

Starting with this release, for the 2017 series, USTelecom removes CyrusOne capital expenditures from its historical data. CyrusOne owns and operates data centers and collocation facilities. Cincinnati Bell, an ILEC that is included in the USTelecom capital expenditures data series, [acquired](#) CyrusOne in 2010. In 2013, Cincinnati Bell [spun off](#) CyrusOne as an independent company.

USTelecom retained CyrusOne in its capital expenditures data series since 2013 to maintain consistency with prior years. At the time, many ILECs were building or acquiring data centers. More recently, however, ILECs have decided to exit that business by spinning off data center properties. These include [Windstream at the end of 2015](#), [Verizon in mid-2017](#), [CenturyLink in mid-2017](#), and [AT&T in 2018](#). As these companies exit the data center business, USTelecom is not tracking capital expenditures for the divested properties. Nor is it possible to isolate data center capital expenditures prior to spinoff. Nonetheless, to be consistent, we now remove CyrusOne from the broadband provider capital expenditures series.

In addition, it became apparent that, in the last two years, CyrusOne's growth was skewing the data series. Its capital expenditures grew from an average of approximately \$250 million in from 2013 through 2015 to \$732 million in 2016 and \$1.407 billion in 2017, with much of this spending reflecting real estate investment. For example, in 2016, CyrusOne's capital expenditures tripled, growing by half a billion dollars. This growth, primarily from real estate investment, offset approximately one-fifth of the broadband spending decline from 2015 to 2016. The acceleration proved not to be an anomaly: in 2017, CyrusOne's capital expenditures nearly doubled again. If USTelecom were to retain CyrusOne in its 2017 data series, these predominantly real estate

investments would have inflated broadband provider capital expenditures growth by fifty-percent, i.e., they would have accounted for one third of capital spending growth in 2017. See Chart 3.

Chart 3

Adjustments to USTelecom Broadband Provider Capital Expenditure Estimates 2015-2017

	USTelecom Estimated Broadband Provider Capital Investment (Wireline, Wireless, and Cable, \$Billions)							
	2010	2011	2012	2013	2014	2015	2016	
2015 Series								
Series Before Handset Adjustment	68.0	68.2	68.8	75.4	77.5	78.5		
Less Sprint Capitalized Handsets	-	-	-	-	(0.1)	(2.2)		
Final 2015 Series After Handset Adjustment	68.0	68.2	68.8	75.4	77.4	76.3		
New 2016 Adjustments								
Cable / CLEC								
Cable Data Series Revision	0.1	0.1	0.8	1.1	1.3	1.8		
Eliminate Duplication in CLEC and Cable Line Items	(0.2)	(0.3)	(0.3)	(0.3)	(0.3)	(0.4)		
Windstream								
ARRA Stimulus Expansion	-	0.022	0.105	0.036	0.013	-		
CAFI Expansion	-	-	-	-	0.013	0.074		
Data Revision	-	-	-	0.029	-	-		
Uniti (CS&L) REIT Spinoff	-	-	-	-	-	0.044		
	2010	2011	2012	2013	2014	2015	2016	
2016 Series								
Series Before Handset Adjustment	67.9	68.0	69.4	76.2	78.5	80.1	78.1	
Less Sprint Capitalized Handsets					(0.1)	(2.2)	(2.1)	
Final 2016 Series After Handset Adjustment	67.9	68.0	69.4	76.2	78.4	77.9	76.0	
New 2017 Adjustments								
AT&T Mexican Wireless Capex Acceleration	-	-	-	-	-	-	(0.5)	
Other Wireless Adjustment	-	-	(0.1)	-	-	(0.1)	(0.1)	
CLEC Adjustments for New Information	-	0.1	0.3	-	(0.1)	(0.1)	0.2	
	2010	2011	2012	2013	2014	2015	2016	2017
2017 Series								
Series Before Adjustments	67.9	68.1	69.6	76.2	78.4	79.9	77.7	79.9
Less Sprint Capitalized Handsets					(0.1)	(2.2)	(2.1)	(2.2)
Less CyrusOne	-	-	-	(0.2)	(0.3)	(0.2)	(0.7)	(1.4)
Final 2017 Series	67.9	68.1	69.6	76.0	78.0	77.5	74.8	76.3
Year over Year Change	3.4	0.2	1.5	6.4	2.0	(0.5)	(2.7)	1.5

Figures may not add due to rounding