

Before the
Federal Communications Commission
Washington, DC 20554

In the matter of)	
)	
XXXX, YYYY,)	
ZZZZ)	
)	Proceeding Number _____
)	File No. EB- _____ -
v.)	
)	
AT&T Corp.)	
One AT&T Way)	
Bedminster, NJ 07921)	
)	

DECLARATION OF EXPERT WITNESS
BRIAN E. WHITACRE

1. My name is Dr. Brian Whitacre. I am a professor and extension economist in the agricultural economics department at Oklahoma State University.

2. I hold a Ph.D. in economics from Virginia Polytechnic Institute. For the last 11 years, my academic position has focused on what technology can mean for domestic economic development. A heavy portion of my research (and outreach) is dedicated to the economic impacts associated with broadband technology. Therefore, I am well-versed in the data and software tools used to explore broadband provision across the United States. Attached is a resume detailing my professional expertise.

3. I have reviewed in detail and am familiar with the contents of the Connect Your Communities (CYC) and National Digital Inclusion Alliance (NDIA) report titled, *AT&T's*

Digital Redlining, which focused on AT&T's broadband provision in the city of Cleveland. As word about this report spread, individuals from other metropolitan areas across the country voiced concern that the AT&T broadband service in their towns followed the same pattern of disproportionately providing inferior technologies to high-poverty neighborhoods. Upon request from Attorney Darryl Parks (who has filed FCC complaints against AT&T regarding their Cleveland and Detroit service area), I performed an analysis of AT&T's provision of broadband service in Dallas County, TX. This analysis followed a similar methodology as the original *Digital Redlining* report, but uses the most recent versions of the publicly available datasets needed for this work (FCC Form 477 from December 2016; Census poverty rates from the 2011-2015 ACS).

4. The analysis for Dallas demonstrates that AT&T has withheld fiber-enhanced broadband improvements from most Dallas neighborhoods with high poverty rates, relegating them to Internet access services which are vastly inferior to the services enjoyed by their counterparts nearby in the higher-income Dallas suburbs.

Background

5. In 2016, Connect Your Community and National Digital Inclusion Alliance learned that residents of many Cleveland neighborhoods were being declared ineligible for AT&T's "Access" discount rate program, solely because they couldn't get AT&T connections at the 3 MBPS download speed which was then the program's minimum requirement. Similar situations were found in Detroit, Dallas, and other cities across the nation.

6. AT&T Access offers discounted broadband service to low-income households, and was adopted by AT&T as a voluntary condition as part of Federal Communication Commission approval of its merger with DirecTV.

7. In order to further explore the quality of service offerings by AT&T in Cleveland, CYC and NDIA undertook an analysis of broadband infrastructure deployment in Cleveland using census block level data submitted to the Federal Communications Commission by AT&T via FCC Form 477. This report was published in March 2017. Several months later, NDIA performed similar analysis for other cities, including Detroit. Dallas was not part of this analysis. However, subsequent news coverage of the “digital redlining” complaints led to additional cities coming forward. This declaration follows the process of the Cleveland NDIA report to demonstrate that the same basic pattern holds in Dallas. The evidence laid out below suggests that AT&T systematically provided lower levels of broadband access to high-poverty neighborhoods than they did in higher-income locations.

Data Source and Study Goals

8. The FCC’s Fixed Broadband Deployment Data is based on Form 477 reports gathered every six months from all regulated Internet Service Providers. It is released to the public on the FCC website six months to a year later. Among other things, the Form 477 deployment data includes individual companies’ own accounts of the broadband technology they are using to deliver residential service in each Census block, and the “Maximum Advertised Download Speed” (as well as Upload Speed) for each such technology in that block. These speeds are reported in megabytes per second (MBPS).

9. In the case of AT&T, Form 477 block data shows where the company is offering 18, 24, 45 or 75 MBPS download speeds via fiber-enhanced VDSL service, or even gigabit speeds via Fiber To The Home (FTTH), and where their Internet service is limited to slower speeds (often much slower) because it is still delivered over copper wires from a “central office” that may be miles away, using a version of old-style ADSL technology called ADSL2.

10. The Census block data in Form 477 lists the maximum speed of as few as one or two addresses in a block. Therefore if a Census block is listed as ADSL2 “Maximum Advertised Download Speed” of 18 MBPS, it is impossible to assume that every household in that block can get that speed.

11. On November 17, 2017, the FCC posted its latest round of Census block broadband deployment data, drawn from providers’ Form 477 reports for December 2016. The CYC/NDIA analysis is based on that a prior version of that release (June 2016 data). The maps and data included in this declaration thus use the most recent data available. It is worth repeating that this data is provided by AT&T itself.

12. The goal of the underlying analysis is to use the Form 477 Census block data to answer three questions: 1) Where has AT&T invested in providing its mainstream Internet speeds and video services to residents, and where has it chosen not to do so? 2) How does AT&T’s deployment of FTTH/VDSL service compare to the distribution of high poverty areas, especially in the city of Dallas? 3) Where are AT&T’s “maximum advertised download speeds” still provided by ADSL2 technology – i.e. old-style copper wire from a “central office” – and what are those speeds, especially in the Census blocks farther away from the central offices serving them?

13. To address the first two questions, I mapped all the Census blocks in Dallas County where AT&T's Form 477 data indicates it was able to provide Internet access via three different technologies: ADSL (the slowest); VDSL (faster), and FTTH (fastest), in December 2016. I also mapped the Census Blocks where a maximum download speed of 18 MBPS or more existed (generally only available with the fiber-based VDSL and FTTH). I then overlaid a map of all the Census block groups in the county where 35% of residents had incomes below the poverty line according to the most recent Census data available (from 2011-2015).

14. The specific steps taken to obtain the broadband deployment data were:

- a) Download the state-level (Texas) December 2016 Fixed Broadband Deployment Form 477 data from: <https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477>
- b) Remove all non-AT&T observations
- c) Remove all non-Dallas County observations (FIPS code 48113)
- d) Generate a “maximum speed offered” and “maximum technology offered” by Census Block. Many Census blocks include multiple listings for AT&T, with each designating a speed / technology that is available to customers. What is ultimately needed is the maximum speed and technology that AT&T offers for each Census block. This can be done by generating a maximum speed offered by Census block, and then dropping all non-optimal observations for that block. The result is a single observation per Census block that contains the maximum download and upload speeds available, and the fastest technology available for that block.
- e) The resulting data is attached to this declaration (Dallas_Co_AT&T_Dec2016.xls)

15. The specific steps taken to obtain the Census Poverty data were:

- a) Visit the “advanced search” version of the Census’ American Fact Finder, available at:
<https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>
- b) Select “Block groups” under “Geographies”
- c) Select State (Texas) and County (Dallas). Select “Add to your selections”
- d) In the Topic Search bar at the top of the page, type “Poverty”
- e) Select ID B17021, “Poverty Status of Individuals In the Past 12 Months by Living Arrangement”, 2015 ACS 5-year estimates.
- f) Download the resulting table into Excel
- g) Create a new “% in Poverty” by dividing the number of households with income below poverty by the total number of households.
- h) Counties with poverty rates over 35% can be assigned by assessing the value of the “% in Poverty” column.
- i) The resulting data is attached to this declaration (Dallas_Co_Block_Groups_Poverty_ACS_11-15.xls). It can be meshed with the Census block-level Form 477 data by merging according to the geographical ID (the first 12 digits of the 15-digit census block ID dictate the block group each observation belongs to).

AT&T home broadband technologies

16. In general, AT&T offers home Internet, “cable” TV programming and IP phone services using one of three delivery technologies: (1) Fiber To The Home (FTTH), (2) Fiber To The Node / VDSL, and (3) ADSL2.

17. The newest and fastest of the three, currently available in some of the Dallas market, is Fiber To The Home (FTTH) – now branded as “AT&T Fiber”. As the name suggests, this is very fast service (typically up to 1,000 MBPS, i.e. 1 Gigabyte per second (GBPS)) delivered by optical fiber all the way to the customer premises. In Dallas County, 6,287 out of the 23,463 Census blocks that AT&T provides service to have FTTH service (26.80%). The average maximum download speed listed for these blocks is over 300 MBPS.

18. The next-fastest AT&T home network technology, built out in Texas and other markets between 2007 and 2014, is Fiber To The Node (FTTN). Data travels via fiber to a “Video Ready Access Device” (VRAD) in a wiring cabinet in a neighborhood, often on a tree lawn or similar location, and then from the VRAD to the customer premises via a copper loop. AT&T’s FTTN system uses an advanced digital subscriber line technology called “Very-high-bit-rate digital subscriber line” or VDSL. VDSL technology can transmit data downstream and upstream simultaneously, at speeds of 100 MBPS or more. AT&T’s Form 477 data lists “maximum advertised download speeds” for VDSL service of 18, 24, 45, and 75 MBPS. In Dallas County, 10,399 out of the 23,463 Census blocks served by AT&T have VDSL service (44.3%). The average maximum download speed listed for these blocks is 56 MBPS.

19. Where AT&T hasn’t upgraded its service to either FTTH or FTTN, new accounts are served using an older technology called “asymmetric digital subscriber line 2” (ADSL2 or ADSL2+). Data travels to an AT&T “central office” via fiber optics, is run through a “Digital

Subscriber Line Access Multiplexer” (DSLAM) there, and then is sent over a copper loop to the customer premises – often a distance of two to three miles or more. The ADSL2 technology used by AT&T has a maximum download speed of 18 to 24 MBPS near the DSLAM, but drops rapidly to 6 MBPS, 3 MBPS or less at distances above a mile. In Dallas County, 6,777 out of the 23,463 Census Blocks served by AT&T have ADSL service (28.89%). The average maximum download speed listed for these blocks is 7.26 MBPS.

20. My understanding is that AT&T categorizes its “advertised speeds” as follows. AT&T’s three lowest advertised speed tiers — and price levels — are now “up to 3 MBPS”, “up to 6 MBPS”, and “up to 24 MBPS.” A service whose maximum speed is 768 kbps is considered “up to 3 MBPS” under AT&T’s rubric. If a customer’s available download speed is really 12 MBPS, under AT&T’s rubric, that service is considered “up to 24 MBPS” on that customer’s bill.

Consumer Use of Broadband and Benefits of Broadband Competition

21. Consumers view ADSL and VDSL2 as services which meet the same needs. Both are broadband services used to reach the Internet, stream video, and other similar needs. Both offerings also compete with other providers of broadband services, such as wired services offered by multichannel video programming distributor, *i.e.*, traditional cable operators.

22. Wireless broadband services, while they provide some similar access to broadband services, are qualitatively different from wired services. Indeed, the FCC’s own 2016 Broadband Progress Report notes, “We find today that fixed and mobile broadband are often used in conjunction with one another and, as such, are not functional substitutes” (p. 6). The report also finds that, “fixed and mobile broadband are currently tailored to serve different

consumer needs” (p. 6). Additionally, the Government Accountability Office (GAO) clearly differentiates between mobile and fixed Internet access in their 2014 report on broadband Internet, highlighting the faster data transfer for fixed connections and potential congestion issues for mobile. Academic research on the subject generally agrees, with Lee et al. (2011) finding that “mobile broadband service is a complement to fixed broadband service.”

23. Even if mobile network improvements over time allow for similar fixed and mobile download speeds, the customer costs and experiences are not comparable. Wireless services are typically subject to data caps or limitations after a particular data threshold is met, and typically must be purchased for each device used, rather than shared as wired services can be. They also suffer noticeable reductions in speed and quality if multiple devices share the same data stream, such as through a mobile wifi hotspot. Therefore, mobile services are often much more expensive than wired services and do not offer as great a value, particularly for low-income consumers. According to AT&T’s website as of mid-2017, their fixed broadband plans start at \$40 / month for 50 MBPS (where available) and 1 Terabyte of data (1,000 GB). Alternatively, AT&T’s mobile broadband for the same price (\$40 / month) comes with only 3 GB of data. On a cost-per-GB comparison, mobile is over three hundred times more expensive (\$.04 / GB for fixed, \$13 / GB for mobile). Higher-data mobile packages cost more, such as their \$90 / month plan for 16 GB. Even AT&T’s unlimited mobile data plan (\$100 / month) notes that “AT&T may slow speeds after 22 GB of data usage.” For prepaid mobile data plans, which are commonly used by low-income customers, AT&T charges \$65 / month for unlimited data (which again may be throttled after 22 GB) but notes that speeds are limited to a maximum of 3 MBPS. Thus, it is unrealistic to claim that a mobile AT&T broadband subscription can serve the same purpose as a fixed one.

24. The lack of competitive fiber-based products reduces competition in the provision of broadband services. Therefore, communities and individual customers who are limited to fixed broadband service offerings from only a single provider (for example, a cable provider) generally face higher prices and lower quality than they would if more than one provider of services were available. The problematic nature of limited broadband competition is firmly established in the economic literature.

Analysis

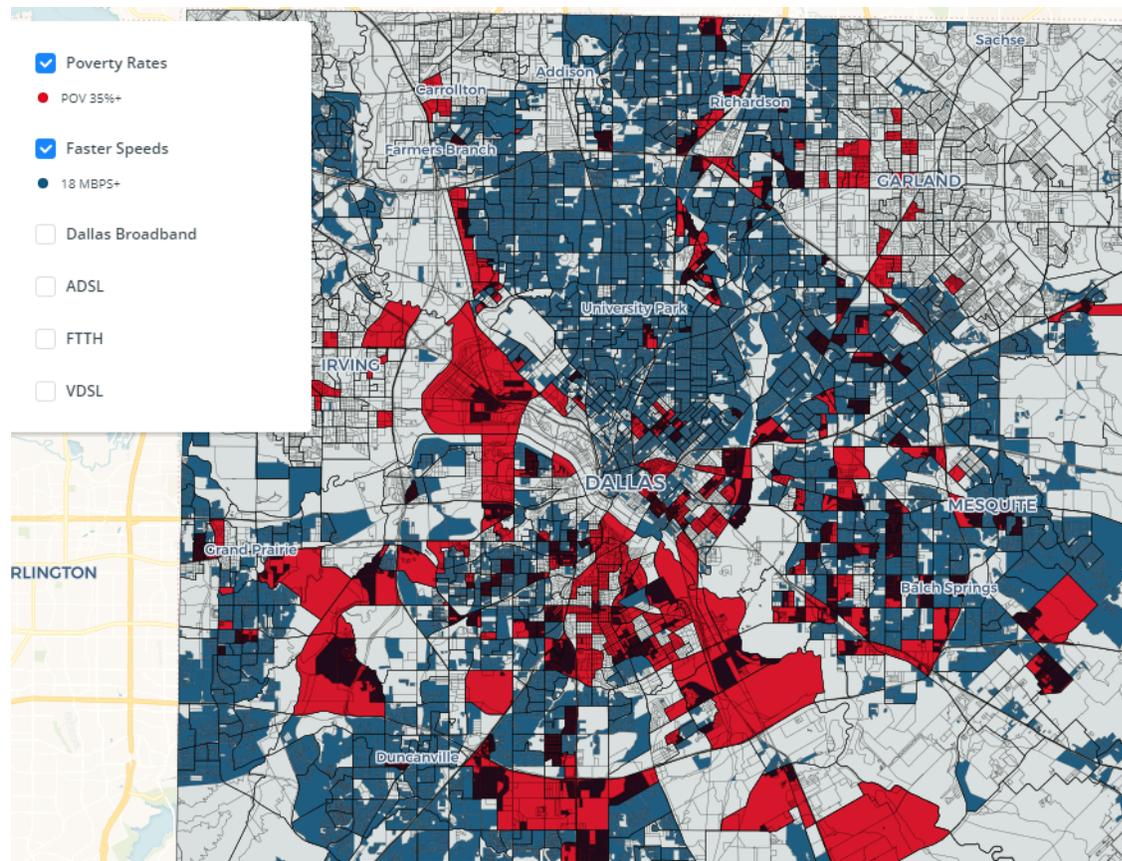
25. The analysis, methodology, and maps below are specific to Dallas, but follow the general outline established in the NDIA's study titled *AT&T's Digital Redlining* (which was focused on Cleveland).

26. As detailed below, the data offers clear evidence that AT&T has withheld both types of faster Internet service – the “Fiber to the Home” (FTTH) and the fiber-enhanced “Fiber To the Node” VDSL infrastructure (VDSL) – from a disproportionate number of census blocks with individual poverty rates above 35% in Dallas County. As a consequence, residents of these neighborhoods: suffer uneven, often severely limited Internet access , in many cases 3 MBPS downstream or less, and also lack access to AT&T's competitive fiber-enabled video service and the benefits such competition and service would bring.

Maps, Data Analysis, and Findings

27. To support these conclusions this declaration analyzes data and provides a series of maps and statistics demonstrating the following:

Map 1: AT&T's FTTH / VDSL (18 MBPS or more) Network Coverage in Dallas County and Block Groups with 35% or Greater in Poverty ([Map 1 Link](#)).



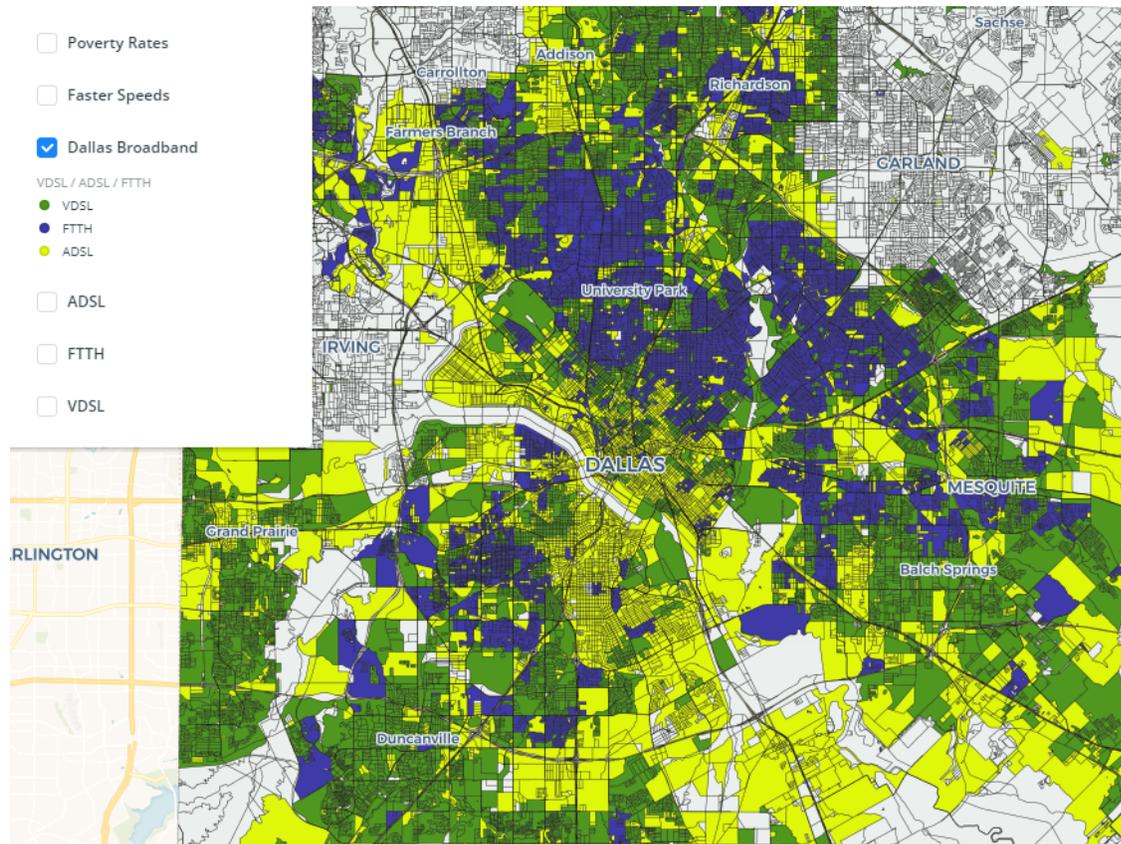
28. Out of the 23,463 Census blocks served by AT&T, 6,777 (15%) have poverty rates of 35% or more. AT&T's higher speed technologies (FTTH and VDSL) cover most of Dallas County but not most high-poverty neighborhoods (Map 1). As Table 1 below demonstrates, this is clearly shown by the distribution of FTTH, VDSL or ADSL across high-poverty Census blocks. The fastest technology, FTTH, was deployed in only 19% of high-poverty Census blocks, but to 28% of those with lower levels of poverty. Similarly, VDSL was only provided to 25% of Census blocks with high levels of poverty – roughly half the rate for non-high poverty Census blocks (48%). Perhaps most strikingly, high-poverty blocks were more than twice as likely to receive the slower-service ADSL (56% vs. 24%).

Table 1: Percentage of Dallas County Census Blocks served by ADSL, VDSL, or FTTH (out of all blocks served by AT&T)

	Pov 35% +	Other
ADSL	56.01%	24.08%
VDSL	25.35%	47.67%
FTTH	18.64%	28.25%
	100.00%	100.00%

MAP 2: AT&T Provision of ADSL, VDSL, and FTTH service in Dallas County and Dallas City

([Map 2 Link](#))



29. Most of Dallas County’s higher-income suburbs are serviced by AT&T’s mainstream FTTH or VDSL service. Most of the higher-poverty regions identified in Map 1 are not, including many in the city of Dallas itself.

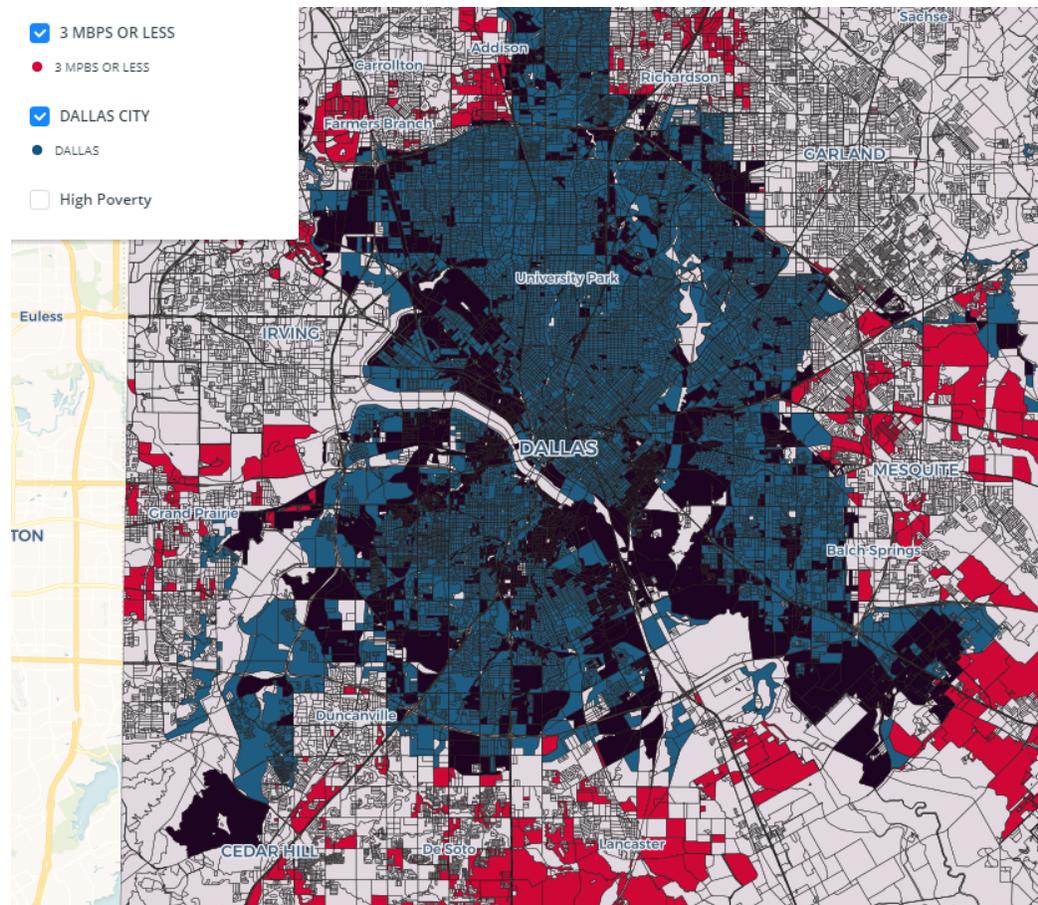
30. The December 2016 Form 477 data lists 23,463 Census blocks in Dallas County served by AT&T with ADSL2, VDSL, or FTTH service. 14,913 of these are in the city of Dallas. Of the 14,913 blocks located in the city of Dallas, the slowest technology (ADSL) is provided in 5,057 (34%). Of the 8,550 blocks in the rest of the county, the ADSL percentage is significantly lower (20%). Table 2 provides more information about the breakout between the city of Dallas and the rest of Dallas County, including the percentage of Census blocks with at least 18MBPS download speed available to them and average poverty rates.

Table 2: Percentage of city of Dallas and Rest of Dallas County Census Blocks Served by ADSL / VDSL (and other characteristics)

	Dallas City	Rest of County
ADSL	33.91%	20.11%
VDSL	31.70%	66.32%
% with 18MBPS available	65.78%	78.74%
Avg. Pov. Rate	20.83%	13.14%

31. There is a glaring correlation between areas where AT&T has not invested in FTTH / FTTN service and areas of high poverty. Even *within* Dallas city Census blocks, there is significant differentiation to the service provided across poverty lines. 59% of Dallas Census blocks classified as high-poverty have only ADSL available to them, compared to only 27% of Dallas Census blocks that do not meet the 35% poverty threshold (data not shown in table).

MAP 3: Dallas Census Blocks with Maximum AT&T Wireline Internet Speeds of 3MBPS or Less, December 2016 ([Map 3 Link](#))



32. Where AT&T has not deployed FTTH / FTTN technology, home Internet speeds delivered by the ADSL2 network vary widely depending on proximity to a central office. Maximum download speeds of 3 MBPS or less are common. Map 3 shows the city of Dallas Census blocks with maximum AT&T wireline Internet speeds of 3 MBPS or less, for December 2016. As this map and Table 3 below demonstrate, over 28% of Dallas city Census blocks were reported by AT&T to have maximum residential download speeds of 3 MBPS or less. The comparable percentage for the rest of Dallas County was 15%. A similar story can be told for

high-poverty (35% or more) Census Blocks within the county: 26% are limited to speeds of 3 MBPS or less, more than double the rate found in the rest of the county.

Table 3: Percentage of Dallas County Census Blocks Served by AT&T With Low Download Speeds, by Location and High-Poverty Status

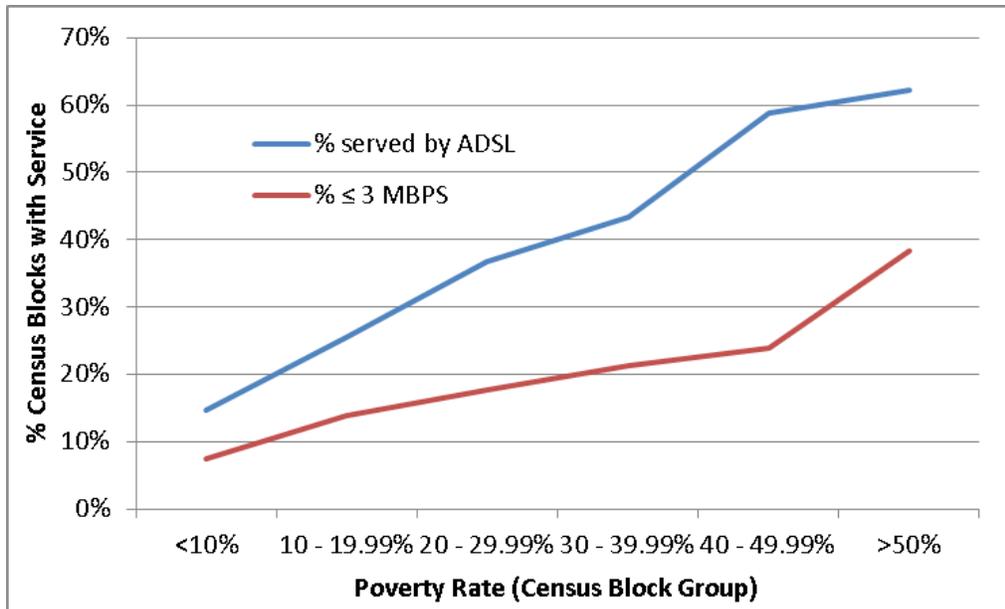
	Dallas City	Rest of County
1.5MBPS Or Less	23.86%	11.84%
3MBPS Or Less	28.84%	14.66%
6 MBPS Or Less	33.67%	20.96%

	Pov 35% +	Rest of County
1.5MBPS Or Less	21.50%	10.12%
3MBPS Or Less	25.97%	12.43%
6 MBPS Or Less	51.67%	25.03%

The above analysis has mostly focused on high-poverty counties (rates of 35% or more).

However, when the analysis is extended to break out the Dallas County Census blocks into more detailed poverty rate groupings, a clear trend emerges (Figure 1).

Figure 1: Percentage of Dallas County Census Blocks served by AT&T that are limited to ADSL and <3 MBPS Service, by Poverty Rate



For the least impoverished blocks (those with less than 10% in poverty), only 15% are limited to ADSL service, and only 7.5% are offered a download maximum of 3 MBPS. As the poverty rate grows, however, so does the percentage limited to ADSL and to 3 MBPS. Census blocks with poverty rates of over 50% are more than 4 times as likely to be limited to ADSL service (63%) and more than 5 times as likely to be limited to 3 MBPS service (38%).

33. One last table further shows that AT&T's technology investment decisions are inextricably linked to high-poverty neighborhoods. As Table 4 demonstrates, AT&T chose to deploy each type of technology (ADSL, VDSL, or FTTH) in at least 6,000 Census Blocks in Dallas County. In those where they chose to provide only ADSL, the percentage of high-poverty blocks was 3 times the rate found in Census Blocks with faster technologies.

Table 4: Dallas County Census Blocks where AT&T chose to Provide ADSL, VDSL, and FTTH Technologies: Number and % High-Poverty

	Census Blocks	Pov 35% +
ADSL	6,777	29.14%
VDSL	10,399	8.59%
FTTH	6,287	10.45%

Conclusions

34. The analysis shows a clear and troubling pattern: A pattern of long-term, systematic failure to invest in the infrastructure required to provide equitable, mainstream Internet access to residents of the central city (compared to the suburbs) and to lower-income city neighborhoods. Specifically, AT&T has chosen not to extend its FTTH or VDSL infrastructure – which is now the standard for most Dallas County suburbs and other urban AT&T markets throughout the U.S. – to the majority of Dallas Census blocks with individual poverty rates above 35%.

35. The study’s results provide clear evidence that AT&T has withheld fiber-enhanced broadband improvements from most Dallas neighborhoods with high poverty rates.

36. The Dallas neighborhoods that did not receive FTTH or VDSL investments have been relegated to an older, slower transmission technology called ADSL2, resulting in significantly slower Internet access speeds than AT&T provides to middle-income city neighborhoods as well as most suburbs.

37. As a result, their residents are left with: 1) uneven, often severely limited Internet access – in many cases 3 MBPS downstream or less; and 2) no access to the competitive fiber-

enabled video service that AT&T promised communities in exchange for “cable franchise reform”, i.e. the elimination of municipal cable franchising, in Texas in 2007.

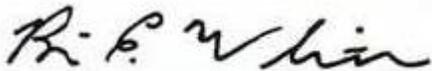
38. Because the patterns revealed by this analysis result from a decade of deliberate infrastructure investment decisions, I argue that they constitute strong evidence of a policy and practice of “digital redlining” by AT&T — *i.e.* income-based discrimination against residents of lower-income urban neighborhoods in the types of broadband service AT&T offers, and in the company’s investment in improved service.

39. This Declaration has been prepared in support of the foregoing Formal Complaint.

40. This statement is true to my personal knowledge, and is made under penalty of perjury of the laws of the United States of America.

41. I declare under penalty of perjury that the foregoing is true and correct.

42. Executed on December 2, 2017.

A handwritten signature in black ink, appearing to read "R. E. Whinn". The signature is written in a cursive, slightly slanted style.

EXPERT SIGNATURE