THE AVAILABILITY OF UNSUBSIDIZED WIRELESS AND WIRELINE COMPETITION IN AREAS RECEIVING UNIVERSAL SERVICE FUNDS

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I. INTRODUCTION

The Universal Service Fund (USF), maintained through contributions made by telecommunications providers across the U.S., supports the deployment of telecommunications services in high cost areas. The USF provides subsidies that are available to competitive and incumbent telecommunication providers alike. More specifically, competitive telecommunication companies, including wireless carriers, can be designated a Competitive Eligible Telecommunications Carrier (CETC), provided they agree to meet certain standards. These standards include providing a local calling plan and agreeing to serve all residents in a given area.[1]

USF subsidies are clearly meant to create incentives for the private market to behave in ways that would otherwise have not occurred without the availability of these subsidies. This is the primary argument of those who support subsidies for wireless CETCs. They suggest that subsidies allow carriers to increase the availability of their service offerings. These carriers would have policy makers believe that there are substantial parts of the U.S. where competitive service is available solely because of these subsidies.

In this paper, I present a detailed analysis of the availability of wireless competition in areas receiving CETC funding. As I will show, in the areas where CETCs are receiving subsidies, the vast majority of the population has access to service from other unsubsidized wireless and wireline providers. In fact, despite collecting over $637 million in subsidies in 2006 for providing service in the lower 48 U.S. states, wireless CETCs provide little incremental coverage compared to unsubsidized carriers. Furthermore, in the areas where wireless CETCs are receiving funds, unsubsidized carriers cover significantly more population than the CETCs cover.

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[1] For a more detailed description of the USF program and the policy issues associated with USF subsidies to CETCs, see Kevin W. Caves and Jeffrey A. Eisenach, *The Effects of Providing Universal Service Subsidies to Wireless Carriers*, Criterion Economics (June 2007).

Section II of this paper describes the methodology and sources that I used to prepare this analysis. Section III discusses the distribution of CETC subsidies across individual carriers as well as carrier type (i.e., wireless or wireline). Sections IV and V provide quantification of service availability as well as calculations of incremental availability and the implicit cost of such availability. In these sections, I also provide examples for individual carriers receiving CETC subsidies. Finally, section VI summarizes my findings and provides recommendations for policy makers.

II. METHODOLOGY AND SOURCES

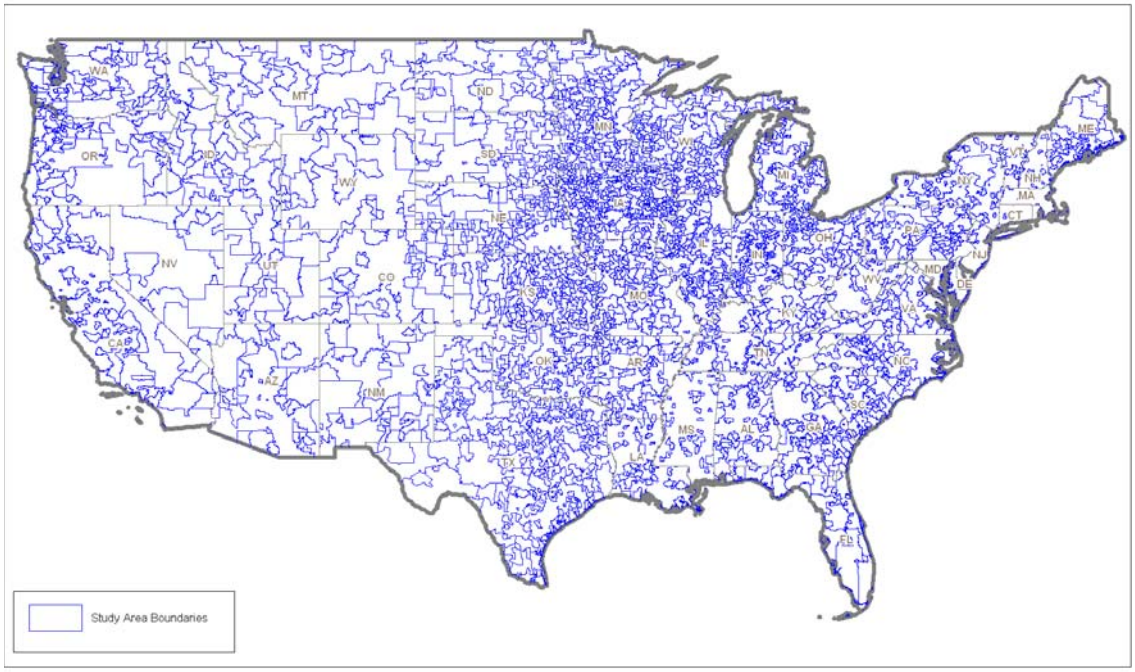
In my analysis, I provide detailed quantification of the coverage provided by mobile wireless (CMRS) carriers. The purpose of this section is to explain the methodology and data sources that were used to create the maps and analysis that follow. For the purposes of my analysis, I focus exclusively on the lower 48 states.[2]

It is important to note the subsidy that ILECs receive for serving a given area is based on their costs. CETCs, on the other hand, rather than having to file their own cost studies, receive the same subsidy per line as the incumbent wireline carrier serving the area.

Since CETC subsidies are based on the number of customers they serve within ILEC boundaries, it is possible to analyze the availability of service in the same geographic areas that are served by unique ILECs. The area within a given state served by an ILEC is called its "study area." This generally comprises the areas served by on or more central office, or wirecenter, operated by the ILEC. The calculation of universal service subsidies for ILECs, and by extension for CETCs, is performed at the study area level. Figure 1 shows all 1,400 study areas in the lower 48 states.

[2] USF subsidies are also available in Alaska, Hawaii, Guam, Puerto Rico, the Northern Mariana Islands and the U.S. Virgin Islands.

Figure 1:
Study Area Boundaries



In my analysis, I examine the availability of competition within each study area. To do so, I rely on the following sources of information:

- **ILEC Wirecenter Boundaries** – to determine the specific geographic "study area" served and to aggregate the funding, both ILEC and CETC, of any given area. The FCC provides wirecenter boundaries for each ILEC.
- **Population Demographics** – to determine the specific population within ILEC wirecenters and study areas, within wireless coverage areas, served by cable modem service, and served by cable telephony. The US Census Bureau provides this information at a very granular, block group level.
- **Wireless Coverage** – to determine the specific area covered by each wireless carrier. Wireless carriers make this information publicly available either on their websites or through their stores.

- **Cable Provider Availability** – to determine the specific area where cable modem service and cable telephony are available. Warren's Cable Factbook provides this information.
- **CETC Designation** – to determine CETC status and funding of each wireless and wireline operator. The Universal Service Administrative Corporation provides this information in its quarterly fillings.[3]

In order to quantify the coverage provided by various wireless carriers throughout the lower 48 states, I examined the public coverage maps that carriers display on their websites and in their retail stores. In several cases, staff members in retail locations of several wireless carriers were willing to print out detailed coverage maps. I gathered the coverage maps for 47 wireless carriers that provide service in various parts of the U.S.

Based on my experience, both working with wireless carriers and working on various other regulatory proceedings, this analysis has typically resulted in very accurate forecasts. Carriers have the incentive to be as accurate as possible with their coverage maps, in part because they understand how critical churn is to carrier economics and, in turn, to Wall Street. That is, a customer who purchases service from a cell phone carrier based on the carrier's coverage map, only to find that the map overstates coverage, is more likely to drop that service, resulting in higher churn rates. In fact, Cingular Wireless ("More bars in more places" – referring to signal/coverage quality) recently conducted an advertising campaign touting its extensive coverage and low number of dropped calls.

I "digitized" the coverage maps for each carrier, storing the information in a geographic information system (GIS) database. Digitizing is a means of converting the maps into a digital

[3] In a small number of cases, my review of the USAC data showed that carriers classified as Wireline carriers in the database were misclassified and should have been classified as Wireless carriers. I corrected these errors, resulting in minor changes to aggregate totals for some carriers, but did not affect my overall results.

mapping format. A GIS database is a database system with specific capabilities for spatially referenced data, as well as a set of operations for analyzing that data. Data in this format can be plotted on a map for visual references as well as for distance/proximity calculations.

Using the digitized maps, census block group information for population, and ILEC wirecenter boundaries, I was able to determine specifically how many residences are covered by each carrier, and, based on Census data on household size, translate this data into the number of people with coverage at their homes in each area. While people do not purchase cellular telephone service solely to receive service at their homes, the availability of home service is important to most customers. Thus, the proportion of the population whose homes have coverage is an excellent indicator of overall coverage.

Based on the FCC data on wire center boundaries, and using the same procedure, I am also able to determine how many people are served by each ILEC in each of the 1,400 study areas.

With information on where CETCs are receiving funding, I am able to determine the population covered by wireless CETCs as well as the population covered by unsubsidized wireless providers within each ILEC study area.[4] For each study area, I compare the level of CETC funding received relative to the population that is covered by each respective carrier as well as to the coverage provided only by CETCs where no unsubsidized service exists.

Finally, I determined the availability of cable modem and cable telephony services throughout the lower 48 States. To perform this analysis, I relied primarily on the Warren's Cable Factbook, which provides cable system information for each cable system/franchise in the US. This information from Warren's is contained in a GIS format which allows us to match cable system boundaries to ILEC wirecenter boundaries.

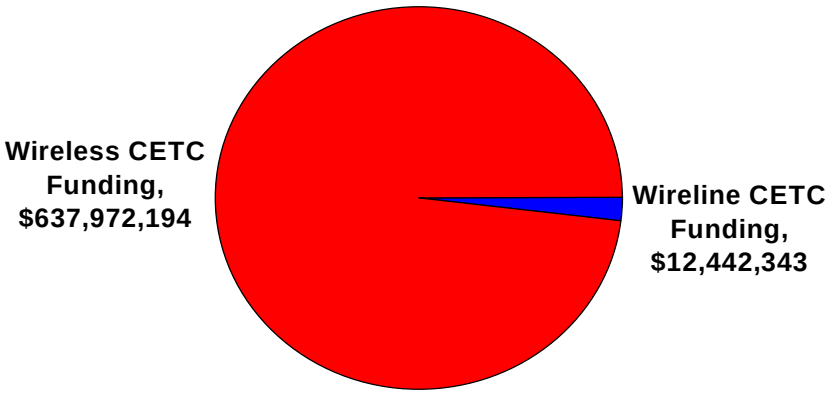
III. CETC FUNDING DISTRIBUTION

A. CETC Funds Are Predominately Distributed to Wireless Carriers

Both wireline carriers and wireless carriers are eligible to become CETCs. In fact, CETCs may offer either wireless or wireline services or both. In practice, however, the vast majority of CETC funding goes to wireless operators. For that matter, as I will demonstrate, many other wireless providers operate without receiving subsidies.

In 2006, all CETCs collected $820 million of subsidies. In the lower 48 states, excluding Alaska, Hawaii, Guam, Puerto Rico, the Northern Mariana Islands and the U.S. Virgin Islands, wireless CETCs received $638M of subsidies, and wireline carriers only received $12.4M. Figure 2 displays the imbalance between wireless and wireline CETC funding:

Figure 2:
CETC Funding Distribution



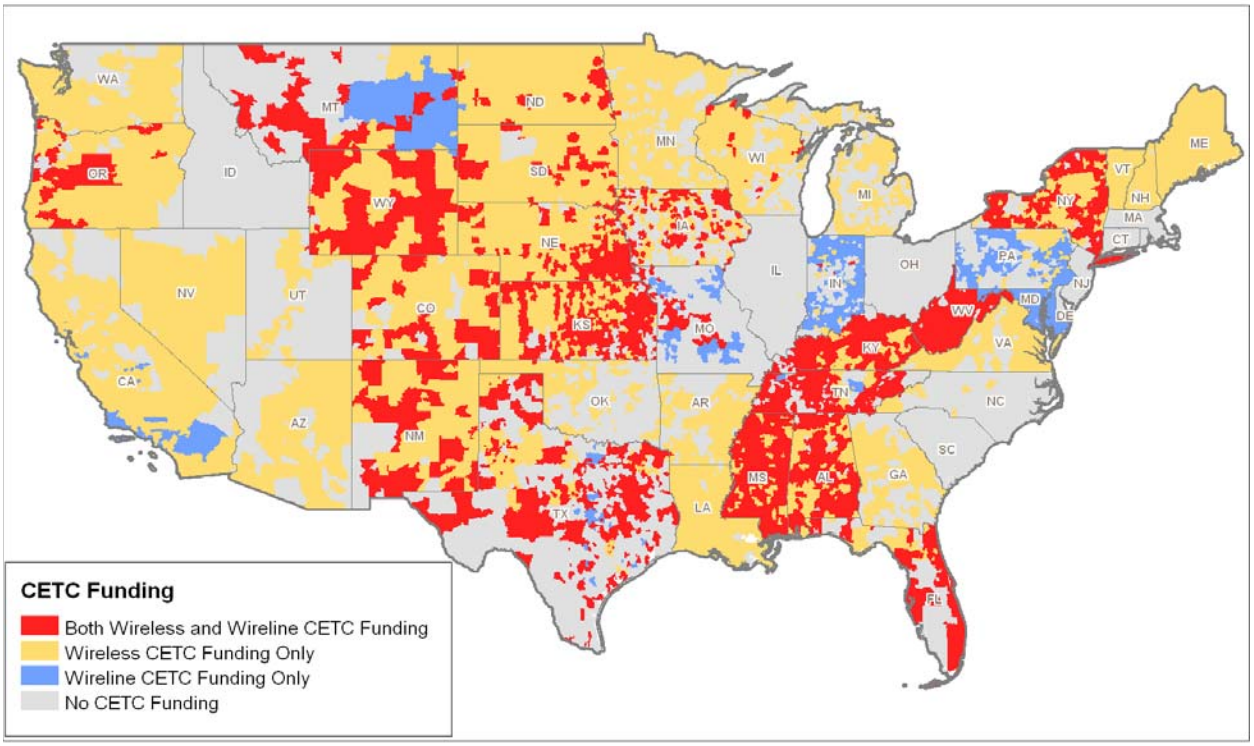
While 64% of wireline CETC subsidies are distributed to competitive carriers operating in RBOC territory, only 27% of wireless subsidies are distributed in the same areas. When I exclude

[4] Calculations of CETC funding by ILEC study area were performed by Criterion Economics. See Caves and

AT&T's Mississippi territory, which receives 15% of all CETC funding in the lower 48 states, RBOC study areas still account for over 58% of wireline CETC subsidies but for only 14% of wireless CETC subsidies.

Figure 3 highlights study areas based on the types of CETCs operating and receiving subsidies. The areas highlighted in red have both wireless and wireline CETCs receiving subsidies, orange study areas contain only wireless CETCs, and blue study areas contain only wireline CETCs. The grey study areas contain no active CETCs which are receiving subsidies.

Figure 3:
Study Areas by CETC Subsidy Recipients

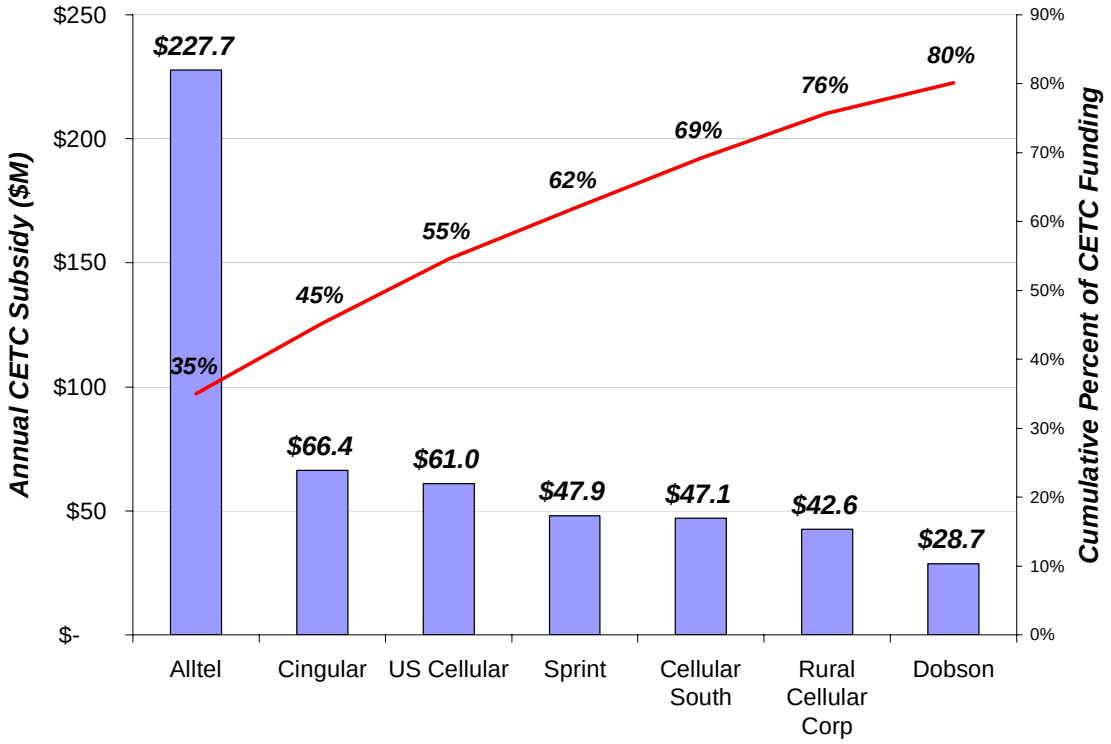


Eisenach for more information.

B. CETC Funds Are Highly Concentrated Among a Small Number of Carriers

Many CETCs are large national wireless carriers with operations in multiple states. In 2006, Alltel received approximately $228M of subsidies, accounting for 35% of the total CETC distributions in the lower 48 states. As Figure 4 below shows, two carriers account for 45% of total CETC funding and the top seven carriers account for 80% of CETC funding. In 2006, there were a total of 123 companies operating in the lower 48 states who received CETC subsidies.

Figure 4:
2006 CETC Subsidies Received by Carrier (Lower 48 States)



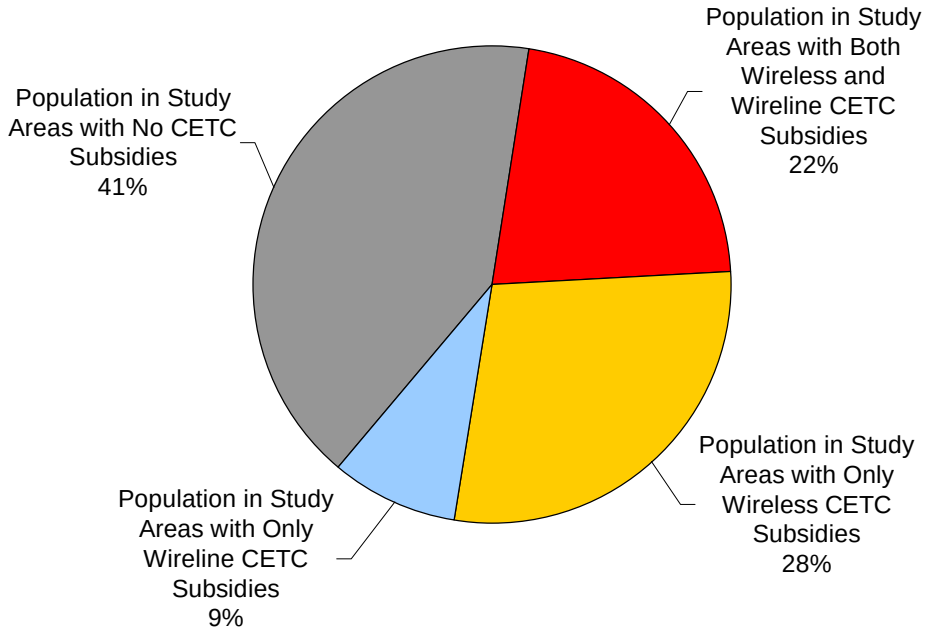
As shown in Figure 4, the three largest recipients of wireless CETC subsidies are national or (in the case of Alltel) "super-regional" carriers. On the other hand, two of the "big-four" national wireless carriers, T-Mobile and Verizon, receive little or no CETC subsidies.

IV. Availability of Competition in Areas with Wireless CETCs

A. Summary

In the lower 48 states, there are approximately 296 million people. Of these, 41% of the population, or 122 million people, live in study areas for which CETCs receive no subsidies from the USF's High Cost Fund (HCF). As the figure below shows, more than 50% of the population, or 148 million people, live in areas where wireless providers are receiving HCF funds. Of these, 83.4 million live in study areas which receive funds only for wireless (not wireline) CETCs. However, many of the people living in the areas where wireless carriers receive subsidies actually have no home coverage from these carriers.

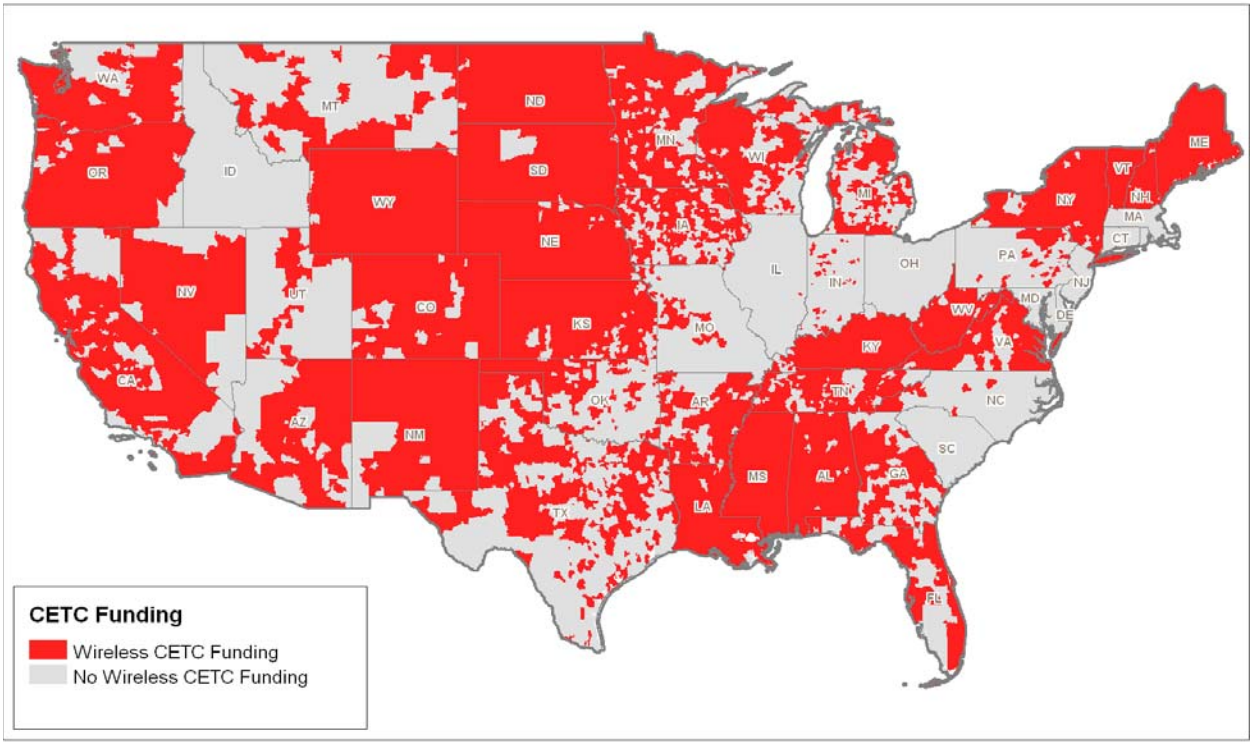
Figure 5:
Population Distribution Based on Study Area Subsidies



Across the 1,400 study areas, there are 814 areas where wireless companies are receiving subsidies. As shown in Figure 5 above, these study areas contain 147.6 million people, or 50% of the total population in the lower 48 states. Within these 814 study areas, only 103.2 million people are actually covered by subsidized CETC wireless carriers. Unless otherwise noted, all of the

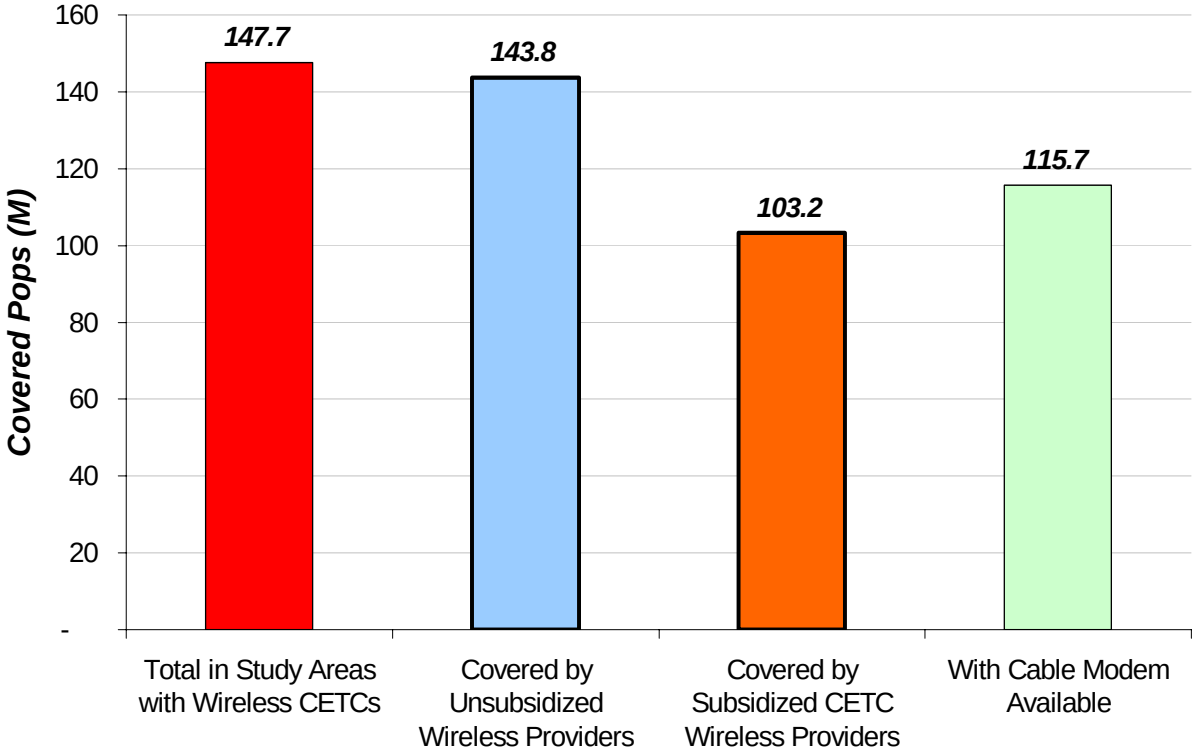
information presented in Section IV relates exclusively to these 814 study areas, which are shown in Figure 6.

Figure 6:
Study Areas Where Wireless CETCs Receive Subsidies



As shown in Figure 7 below, wireless carriers which receive no USF subsidies cover a significantly larger portion of the population in study areas receiving CETC subsidies than do the subsidized carriers. In total, there are 143.8 million people who are covered by one or more unsubsidized carriers in the 814 study areas where other wireless CETCs are receiving funds. Unsubsidized carriers cover 97.3% of the population, while subsidized carriers cover less than 70% of the population in these study areas.

Figure 7:
Population with Availability from Wireless and Wireline Sources

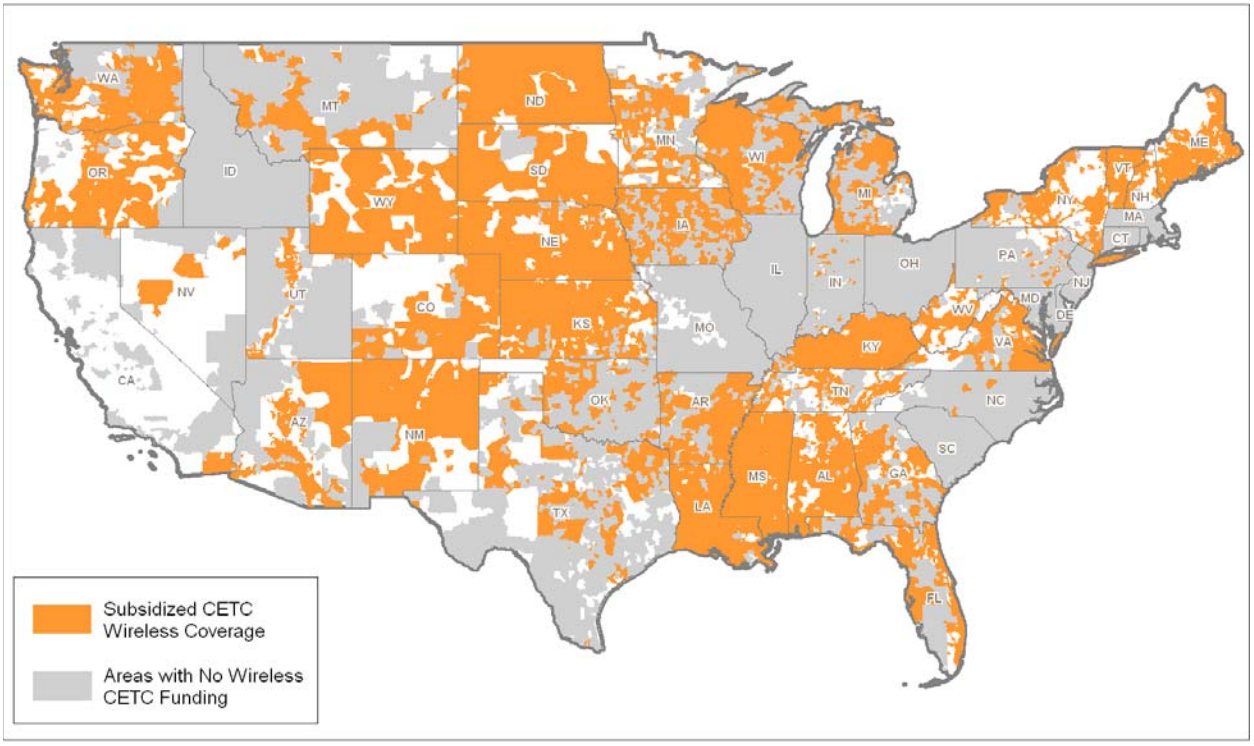


Another measure of overlap is the proportion of the population that receives service from wireline competitors. Due to data limitations, I did not estimate the proportion of the population that receives competing service from traditional CLECs. However, I did estimate the proportion with cable modem (and thus, VoIP) service available. Cable modem service is available to more people in these study areas (115.7 million) than have service from subsidized wireless CETCs.

B. Coverage by Subsidized Carriers (CETCs)

As discussed above, there are 814 areas with subsidized wireless competition. The attached map, Figure 8, shows the coverage of wireless CETCs in these areas. In total, subsidized carriers cover 103.2 million people, but fail to provide coverage to nearly 45 million people who are located in these study areas.

Figure 8:
Coverage by Subsidized Wireless Carriers



At the same time, CETC funding is highly duplicative. Of the 103.2 million people with coverage from wireless CETCs, over 52% have coverage from more than one subsidized CETC, indicating that a majority of subsidies to wireless CETCs go to provide duplicative subsidized coverage. In fact, nearly 14 million people have coverage from three or more subsidized wireless carriers, and 520,000 have coverage from five or more subsidized wireless carriers.

Wireless CETCs received $638 million of subsidies in 2006, which equates to roughly $6.18 per total covered person ("pop") and $34 per line served.[5] However, as discussed below, many of these subscribers also have access from unsubsidized wireless carriers.

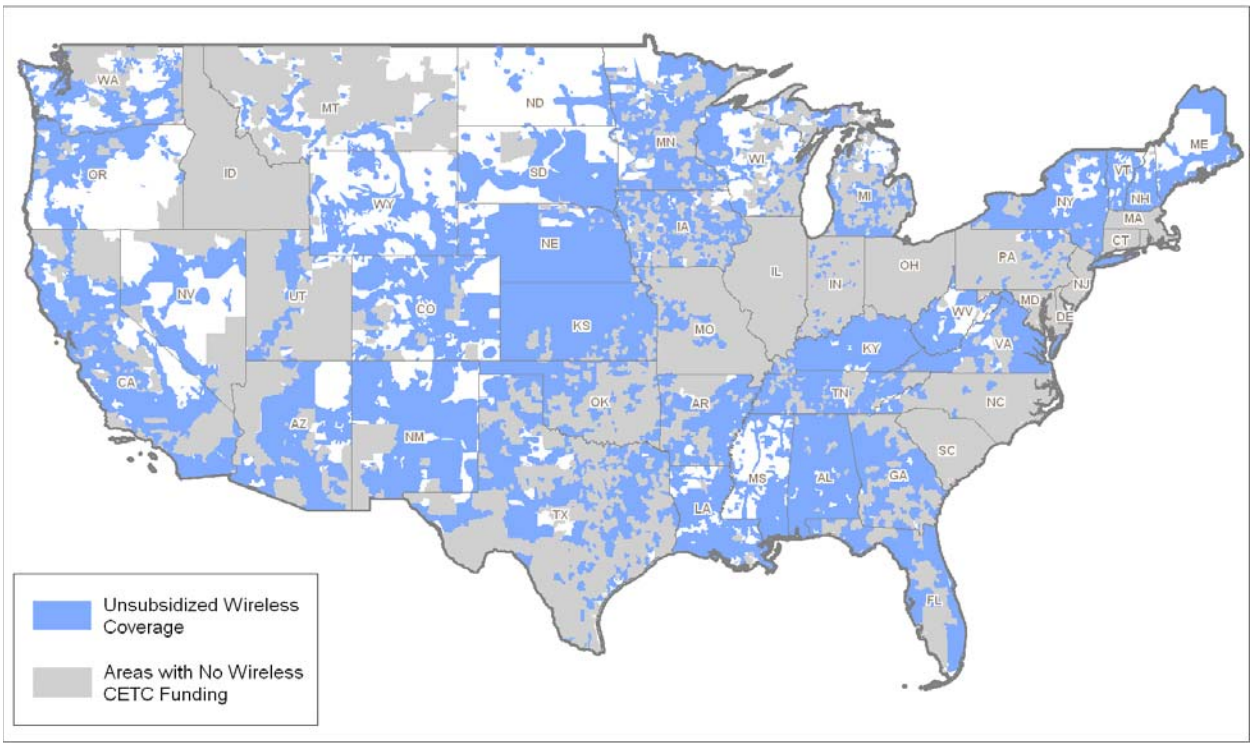
[5] According to the FCC, Wireless CETCs received subsidies for approximately 18.9 million lines. See Caves and Eisenach.

C. Coverage by Unsubsidized Wireless Carriers

Within the 814 areas with subsidized wireless competition, unsubsidized carriers cover over 97% of the population. Figure 9 shows the coverage provided by these carriers. When compared to the same map (Figure 8) for wireless CETCs, it is clear that unsubsidized competitors serve more rural and remote areas than do subsidized carriers.

Additionally, of the 144 million people covered by unsubsidized carriers, 103 million have coverage from three or more different unsubsidized carriers. That is, roughly the same number of people who have access to one subsidized CETC, have access to at least three other non-CETC wireless carriers. In fact, over 20 million people in these areas have access from five or more unsubsidized competitors.

Figure 9:
Coverage by Unsubsidized Wireless Carriers



How can it be that unsubsidized carriers provide significantly more coverage and availability than subsidized carriers? First, most wireless carriers must be deploying their infrastructure without

attention to study area boundaries or subsidies. Second, the deployment of this infrastructure is economically feasible in the absence of subsidies. Finally, subsidized carriers may concentrate their coverage in areas which are easiest to serve (e.g., have higher population densities), and thus most likely already to have coverage from unsubsidized carriers.

D. Coverage by Unsubsidized Wireline Companies

In the areas served by wireless CETCs, there is also a significant amount of unsubsidized wireline competition. This competition comes from cable providers who have deployed cable modem and cable telephony. Excluding the few cable companies which receive CETC subsidies, such as Knology, I estimate that, within the areas where at least one CETC receives subsidies, unsubsidized cable modem service is available to 116 million people and cable telephony is also available to 63 million of these.

Again, these carriers have shown that it is economical to deploy infrastructure in many areas eligible for USF support without the benefit of subsidies. Cable operators leverage their plant to provide services that are incremental to the traditional video services. Their plant is already installed, and once cable modem service has been deployed, it requires little incremental capital to deploy cable telephony. In addition to cable telephony, every person who has cable modem service available from these cable companies also has access to VoIP from providers like Vonage, Sunrocket, and Net2Phone. The cable operators, who receive no subsidies (but do, to the extent they offer cable telephony packages that include long distance telephone service contribute to the USF), cover more people than do subsidized wireless carriers.

V. Analysis of Incremental Coverage

A. Subsidized Wireless Competitors

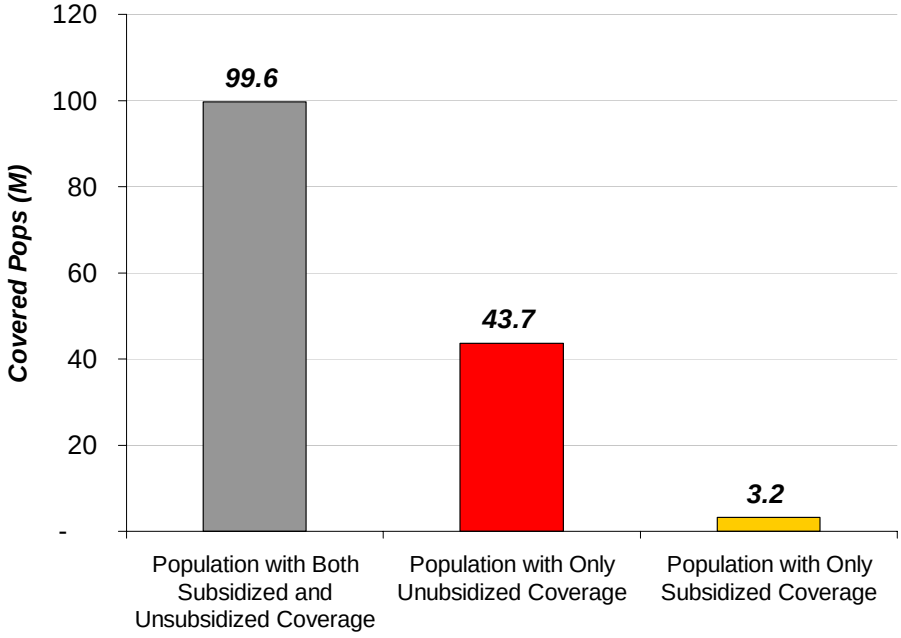
To quantify the specific impact of the lack of coverage by CETCs relative to unsubsidized carriers, I also examined within each study the number of people that were covered by CETCs but

were not covered by unsubsidized carriers. This number could be thought of as the "incremental" coverage that USF funding buys.

Of the 814 study areas where wireless CETCs are receiving funds, there are 485 where the CETCs provide no incremental coverage relative to unsubsidized carriers. In fact, of the 103.7 million pops covered by wireless CETCs, only 3.2 million people, or roughly 1.5 million households, receive coverage from subsidized carriers that is not duplicated by at least one unsubsidized carrier. This equates to about 2% of the 148 million people living in study areas for which wireless CETCs receive subsidies, and translates into an implied subsidy of $187 per incremental covered pop, or over $425 per incremental covered household. Unsubsidized carriers, on the other hand, cover 43.7 million people that are not covered by CETCs in the 814 relevant study areas.

I also compared the subsidy paid to CETCs for each incremental wireless household covered to the subsidies received by the incumbent LECs. The ILECs arguably provide 100% of households in their study areas with incremental wireline coverage. Therefore, the analytical calculation of wireline subsidy per incremental home covered is simply the total ILEC subsidies in a given study area divided by the total households in that study area. In the 329 study areas where wireless CETCs provide some incremental coverage, this incremental coverage comes at an extremely high relative subsidy, especially when compared to incumbent wireline carriers. In 227 of these study areas, the incumbent LECs actually receive a smaller subsidy per household served than the subsidized wireless carriers receive per incremental household. In these 227 study areas, the ILEC receives roughly $16 per household, while subsidized wireless carriers receive over $270 per incremental household.

Figure 10:
Coverage Provided by Subsidized and Unsubsidized Carriers



If CETC lines are distributed in the same manner as population across the CETC's covered footprint, this would imply that only 628,000 of the 19 million CETC lines (~3%) are truly incremental. This implies that carriers are receiving, on average, $1,015 annually per incremental subscriber, or $95 per incremental subscriber per month.

B. Alltel

As noted above, Alltel is the largest CETC recipient of USF funding and, not surprisingly, one its most aggressive defenders. In total, the company covers roughly 79.4 million pops across 867 study areas. Of these, 34.7 million pops are located in study areas where Alltel is a CETC and receives HCF subsidies. Figure 11, shows Alltel's wireless coverage in the lower 48 states.

Figure 11:
Alltel Wireless Coverage – Subsidized and Unsubsidized

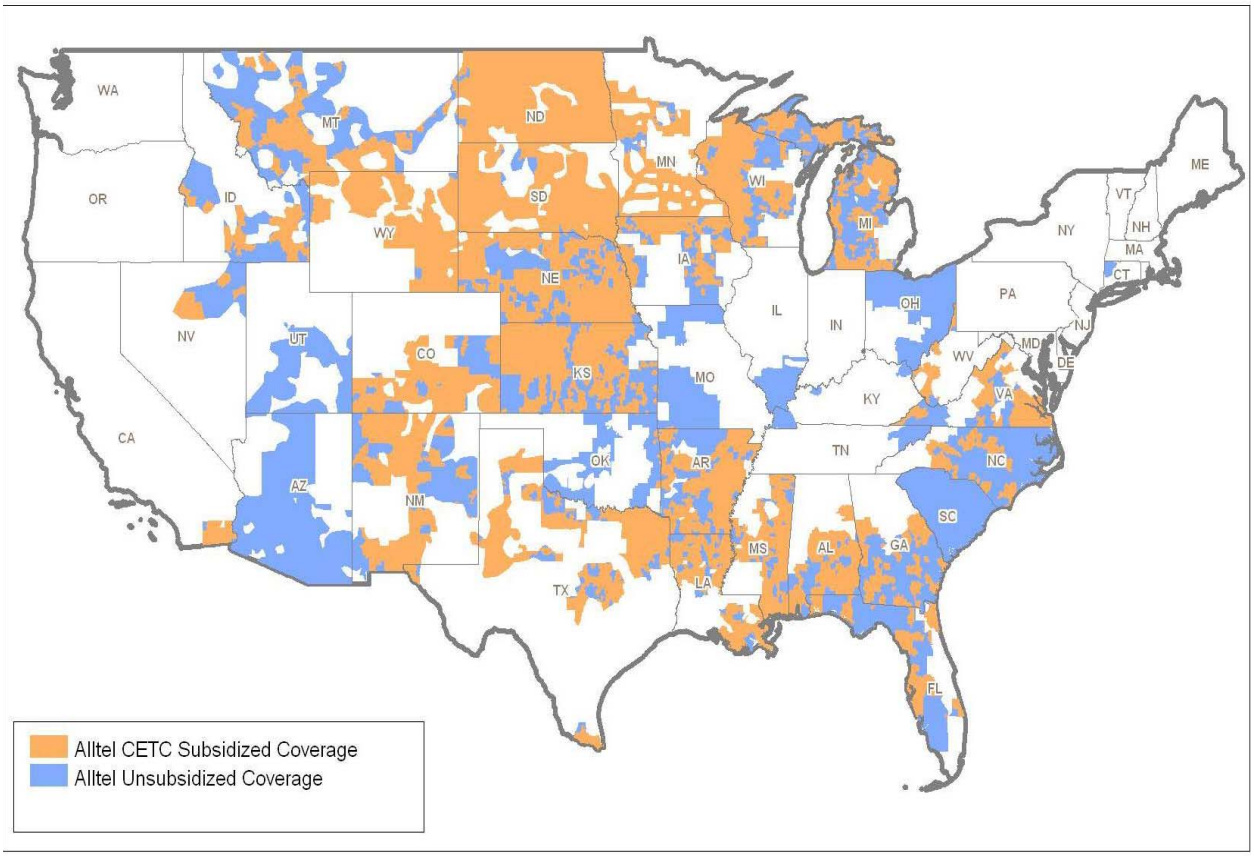
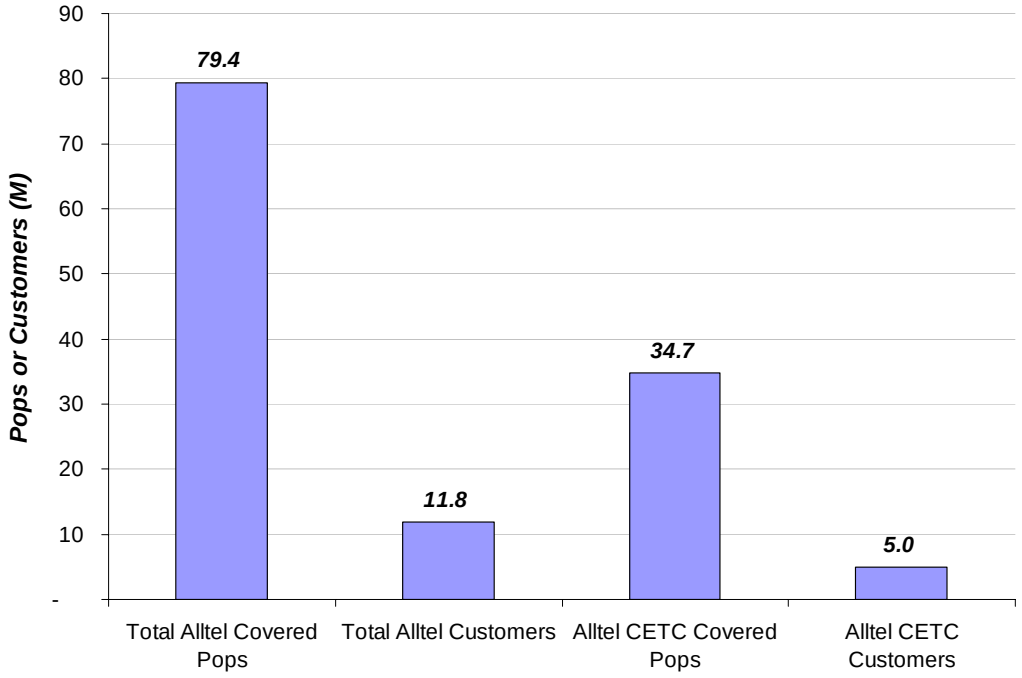


Figure 12 shows Alltel's coverage and subscribers overall and in the areas where it receives USF subsidies

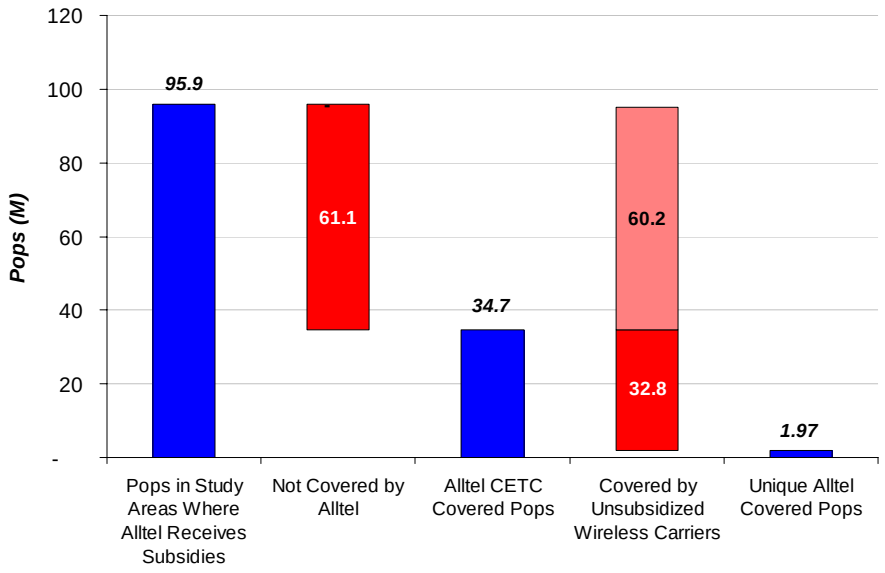
Figure 12:
Alltel 2006 Coverage and Customers – Total and Subsidized



For covering these 34.7 million pops, Alltel received roughly $228 million in CETC subsidies in 2006. With 5.0 million CETC lines in these areas, Alltel received, on average, $45.90 per line, or approximately $6.50 per covered pop and $15 per covered household.

Alltel has testified before Congress and the FCC that these subsidies are being used to provide services and coverage in areas where it would not otherwise reach. In 187 study areas, Alltel provides absolutely no incremental coverage compared with unsubsidized carriers. These 187 study areas represented over $91.8 million of Alltel's total HCF subsidy receipts in 2006. In the remaining 180 subsidized study areas, Alltel only covers 1.97 million people, or about 1 million households, that do not already have coverage from an unsubsidized carrier. This implies that Alltel receives a subsidy of roughly $120 for each incremental pop and $250 per incremental household that it covers. The figure below shows how little incremental coverage Alltel actually provides.

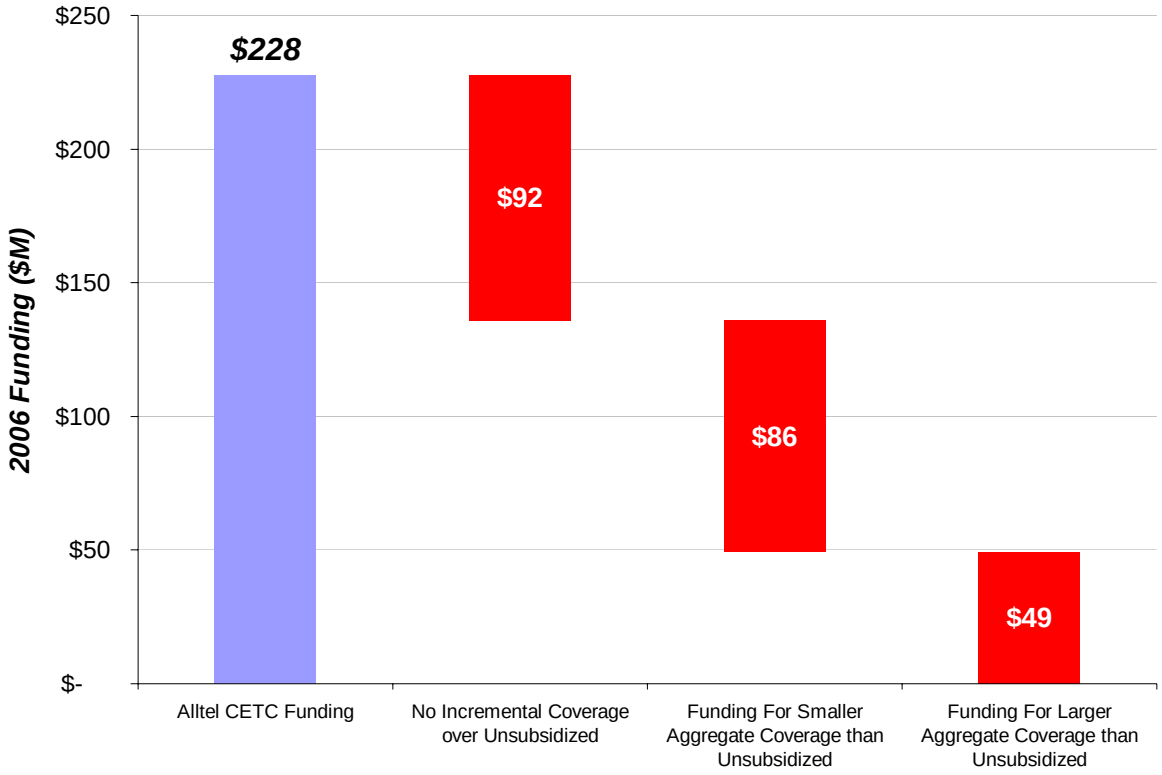
Figure 13:
Alltel Non-Unique Coverage



Assuming Alltel's subscribers are distributed in a manner similar to population, only 265,000 wireless subscribers are in areas where it is the only wireless carrier. Since the company receives $228 million in USF funds, this translates into approximately $860 per incremental line served. Alltel might argue that its lines are highly concentrated in the "incremental coverage" areas. However, this seems highly unlikely, given that Alltel's retail stores are also concentrated in areas where unsubsidized carriers have service. In fact, Alltel has roughly 700 retail stores according to Dunn & Bradstreet, and only 28 of these stores are in areas where Alltel is subsidized and provides unique wireless coverage.

As discussed above, $91.8 million of Alltel's CETC funding is paid based on subscribers located in areas where Alltel provides *no* incremental coverage over unsubsidized carriers. Alltel receives an additional $86 million in subsidies for areas in which the company provides *less aggregate coverage* than unsubsidized carriers. The figure below shows that Alltel's funding is predominantly allocated to areas where Alltel provides less aggregate coverage than unsubsidized carriers:

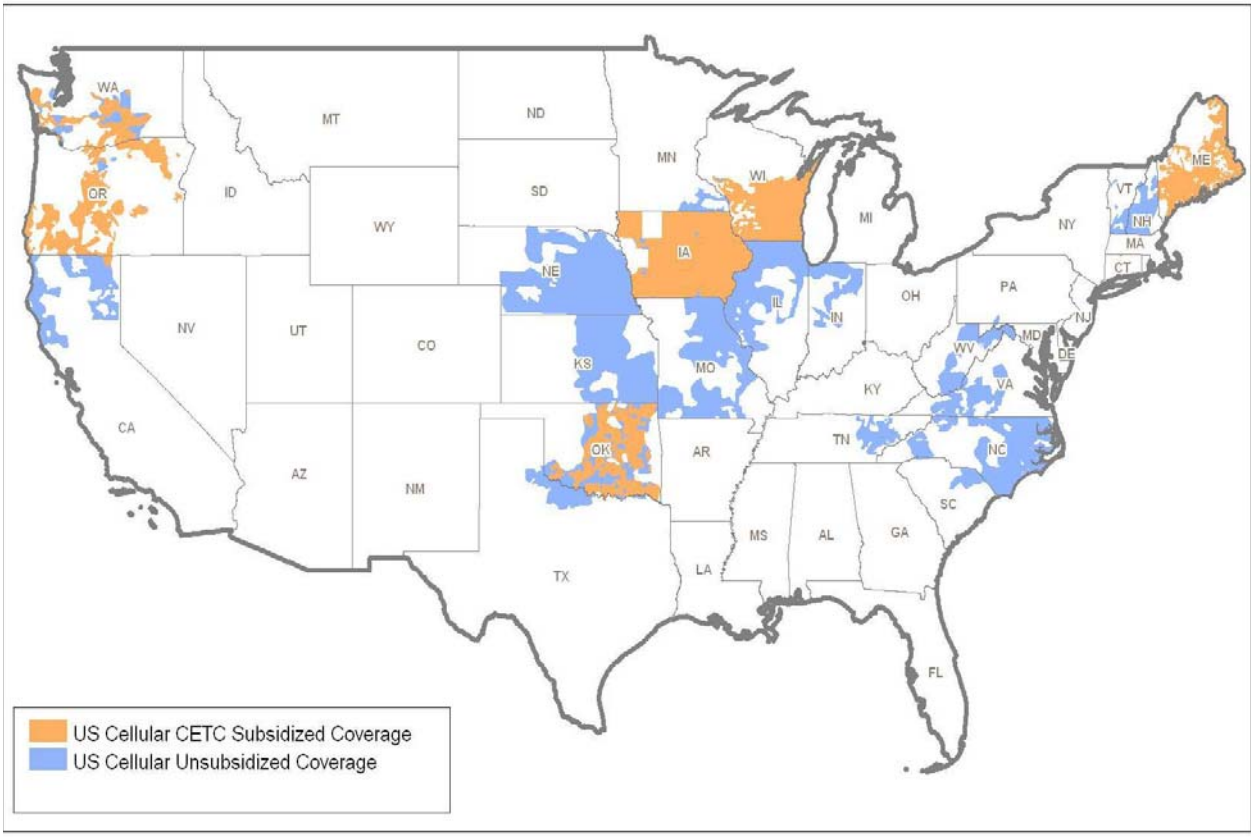
Figure 14:
Distribution of Alltel Subsidies



C. US Cellular

US Cellular is the fourth largest recipient of USF CETC subsidies. The company covers roughly 41 million pops across 564 study areas. The company is a CETC and receives a subsidy in 234 of these study areas, where it covers roughly 5.6 million people. The attached map, Figure 15, shows the coverage provided by US Cellular and whether that coverage is in a study area where US Cellular is receiving a subsidy.

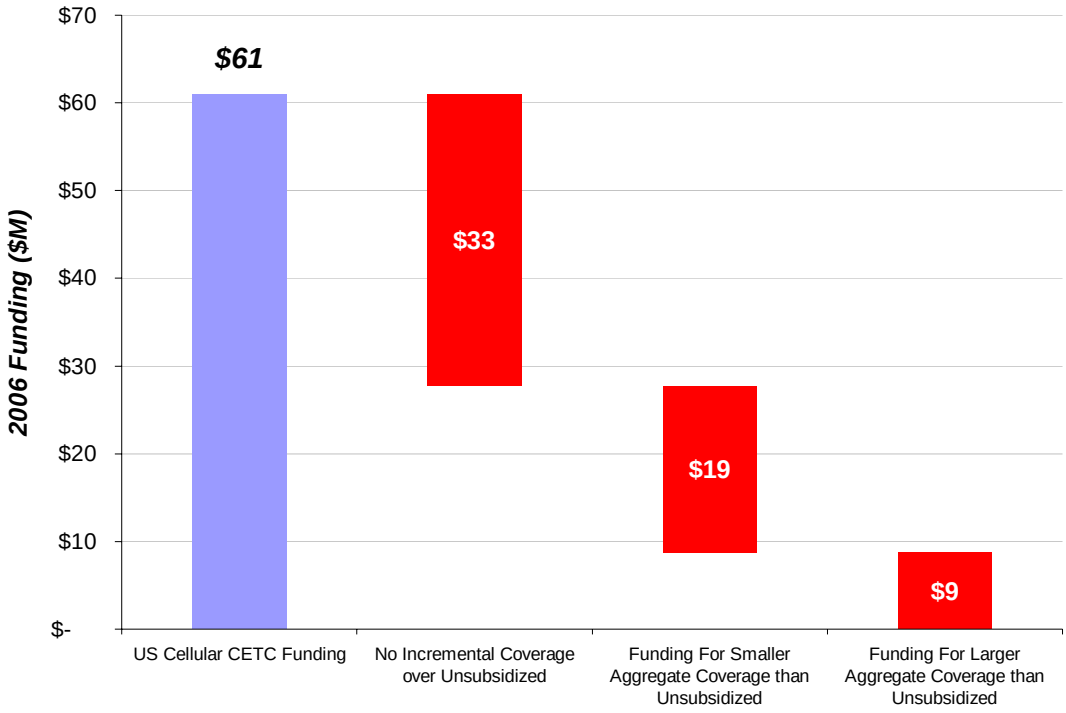
Figure 15:
US Cellular Coverage – Subsidized and Unsubsidized



For providing this coverage and serving 2.1 million subscribers for which it receives CETC subsidies, US Cellular received $60.9 million in subsidies in 2006, or roughly $28.90 per line, $10.90 per covered pop, and $22 per covered household.

US Cellular, like Alltel, provides little incremental coverage over unsubsidized carriers. In 149 of its CETC study areas, US Cellular provides no incremental coverage beyond what unsubsidized carriers provide. For serving subscribers these areas, it received $33 million in subsidies in 2006. This is more than 50% of the total subsidy received by US Cellular.

Figure 16:
Distribution of US Cellular Subsidies



In the remaining study areas, US Cellular covers only 563,000 people who do not have access from another unsubsidized wireless carrier. This implies a subsidy of roughly $110 per incremental covered pop and $290 per incremental subscriber.

VI. Conclusions

Unsubsidized wireless service is abundant in areas where subsidized carriers exist. While CETCs do provide some incremental coverage over unsubsidized carriers, this incremental coverage is small, less than 4% of total covered households, and expensive, roughly $425 annually per incremental household. Furthermore, unsubsidized carriers provide much greater overall coverage in the study areas where CETCs are receiving subsidies. In almost all areas, CETCs do not offer coverage to 100% of the study area.

Coverage by CETCs is also highly duplicative. Over 52% of CETC-covered households have access from multiple CETCs.

Nearly $125 million of CETC subsidy is provided to Alltel and US Cellular, two of the largest supporters of CETC subsidies, for areas where these carriers provide *no* incremental coverage over unsubsidized carriers. If the objective is to make wireless service available where it otherwise would not be, this money is wasted. An additional $105 million is provided in areas where these carriers provide less total coverage than unsubsidized carriers. Just across these two carriers, at least 36% of the total $637 million in 2006 subsidies to CETCs goes to support duplicative service.

Overall, my analysis demonstrates that, to the extent subsidies to wireless CETCs are intended to increase the availability of wireless service in high cost areas, the vast majority of the funds are simply wasted. There are many areas of the U.S. where wireless coverage remains inadequate, but the current programs do not effectively target coverage to those areas.