The COOK Report on Internet Protocol
Technology, Economics, and Policy
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Broadband Mapping, Connectivity, the Five Freedoms, and Prosperity

A Conversation With Sara Wedeman About the Route from 'Here' to 'There'

Editor's Introduction

Given the discussions on the Economics of IP Networks list in April, it has become very clear that the entire area of Broadband mapping is both critical and horribly misunderstood. It has been left to incumbent lobbyists telling stories of indefensible fiction to the lawyers at the FCC. As we decide how to apportion the rural broadband stimulus funds we are at a critical tipping point balanced between what is now the utterly outmoded methodology that has an ILEC or an MSO telling the FCC "we offer broadband in the following zip codes – trust us" and the methodology that Sara Wedeman explains in this interview.

In the 1990s the FCC then took the analytically indefensible tack of assuming that, if the service were offered in a zip code like 19104 it would be available to everyone in that zip code. Now if the availability of dial up Internet service were the question, and the existence of a modem bank to which customers could connect without their connection being metered were the answer, then the breakdown might have made some sense in that anyone with a wireline phone and a computer living in that zip code could be assumed to be a potential customer for Internet service.

But with broadband one is talking, since perhaps 2000, about DSL or Cable modem technology, or in some very rural parts of the US west of the Mississippi, wireless. However, in all these cases one is forced to assume the existence of additional broadband modem equipment or CPI wireless equipment in the home or apartment of the customer. The question here for the vast majority (DSL or cable modem) is: has the service provider brought the connecting technology to the premises of the customer? In other words is so called broadband available not just at one location within the zip code but has it been brought to every building? And by implication to every person in the building?

In the discussion that follows, we shall see that this is clearly not the case. Furthermore relying on the likes

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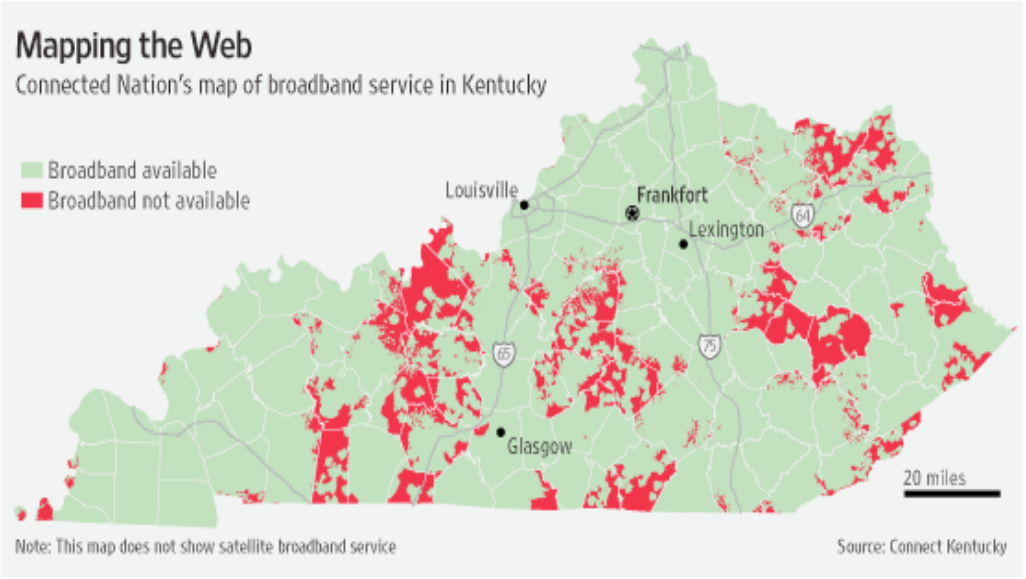
of Verizon, ATT, Qwest, Comcast, Time Warner and so on to assert to the FCC that broadband is effectively universally available within a zip code is ludicrous. Those who would accept Verizon's word are invited to read our June issue. These companies are there to serve stockholders and not the people at large.

Any figures they release are unverifiable. (Our "proprietary business information" say the incumbents.) The Obama administration has with good sense allocated an enormous amount to try to figure out how to target funds for expansion of our rural broadband infrastructure. The task however is fraught with peril due not only to the duopoly's obfuscation but thanks also to the incumbent's creation of Astroturf efforts like Connected Nation. See for example http://www.publicknowledge.org/node/1334 where on January 9 2008 Art Brodsky wrote – "The only telecommunications legislation that has a chance of passing the Congress controlled by Democrats this year is modeled on a group whose apparent accomplishments are open to question and whose origins are in Republican politics in Kentucky. That group is Connected Nation, which began life as Connect Kentucky." [snip] [**Editor**: this is a long article and is well worth the read.]

Now, almost a year and a half later we find Amy Shatz writing in the *Wall Street Journal* of June 1, 2009:

> *Before the federal government spends more than $7 billion to expand broadband Internet service in underserved areas, it wants maps that show where the money should go.*
>
> *But the biggest U.S. provider of broadband coverage maps, Connected Nation Inc., is backed by big telecommunications companies like Comcast Corp., Verizon Communications Inc. and AT&T Inc. that potentially stand to benefit from how the Obama administration doles out the money.*
>
> *As it seeks to provide maps for the federal stimulus program, Connected Nation is coming under fire from officials in its home state of Kentucky, and Internet advocates in Washington leery of its industry ties. Critics complain it uses unverifiable confidential information from phone and cable companies to draw its maps, and worry Connected Nation will use the maps to steer stimulus funds toward its big corporate sponsors, at the expense of smaller players or poorly served areas.*

COOK Report: Ask for a defensible methodology of the Kentucky map and you essentially get "trust us." But the map fails to accurately portray reality, which will become clear to anyone who stops to think about the nature of the input data and what is being claimed. Cable modem or DSL (or fiber as in the case of Glasgow) is in no way available to 100% of the population in the green areas. It might be available in some parts the green areas, but then the question becomes: to what percent of the population? As we shall see, to assert that West Philadelphia zip code 19104 is adequately served because broadband is available to students at the University of Pennsylvania is laughable—or would be, if it were funny.



To Begin With: Why Are We Mapping?

With these issues in mind, I have asked **Sara Wedeman** to explain what needs to be done. I interviewed her on June 4. By way of introduction she replied:

Let us start by taking a step back and considering: why are we doing this, and for whom? I would argue that the rationale for both the mapping and the infrastructure initiative stem from an immediate need to staunch the flow of job losses, and equally from an understanding that high levels of connectivity is directly linked to the health, wealth, and happiness of nations.

I make this statement, in part, based on the work of Amartya Sen, the winner of the 1998 Nobel Prize in Economics. A Harvard professor, Sen won the Nobel for his work demonstrating that famines are caused not by food shortages, but by hoarding, both of food and information. Sen is the author of 22 books and much of his research has focused on the relationship between civil liberties and the wealth of nations. The gap in development between authoritarian and truly democratic countries is the subject of his 2000 book, Development as Freedom. In this work, he describes five interdependent freedoms, which include:

1. Political freedom and civil rights,
2. Economic freedom including opportunities to get credit,
3. Social opportunities: arrangements for health care, education, and other social services,
4. Transparency guarantees, by which Sen means interactions with others, including the government, are characterized by a mutual understanding of what is offered and what to expect,
5. Protective security, in which Sen includes unemployment benefits, famine and emergency relief, and general safety nets.

Although Sen (above) does not specifically mention the Internet, the research that won him the Nobel showed the centrality of free-flowing information to the most elemental aspect of wealth: having enough to eat. Moreover, high speed (upload and download) communication across vast distances clearly accelerates and amplifies the reach of the kinds of communication linked to the adoption of the five freedoms.

Consider the words of Victoria Stodden of the Berkman Center's Internet and Democracy Project:

> *The internet is creating a new mechanism for free speech and political liberty that is nontrivial for governments to control. The internet seems poised to grant such rights directly, and can indirectly bring improvements to positive rights such as education and transparency (see for example MAPLight.org and The Transparent Federal Budget Project). Effective mechanisms for voices to be heard and issues to be raised are implicit in Sen's analysis*.

COOK Report: Thus, while the incumbents see the internet as part of a dollar producing triple play package, it is clearly much more.

Wedeman: Indeed. In this context, mapping makes a lot of sense because it helps us identify where needs are greatest. If done well, it can also help us unravel and diagnose the specific causes of under- or non-service. Diagnosis is key, because if we get it wrong, all the time, energy, and cash invested in 'treatment' of under and non service will be wasted. Any entity that stands in the way of an accurate diagnosis does the nation a great disservice. **Nobody's business model is more important than**

the well-being of the nation. Anyone who argues differently is putting the cart before the horse.

This is a process of discovery rather than one of holding on to what one has, at all costs. It's actually a great case study in behavioral economics because BE research has repeatedly shown that on average, people will fight to the death for what they already have rather than taking a small risk that is likely to bear fruit for all .

Mapping is About People Located Within Geographic Space

Mapping is not just about geography. It's about people located in a geographic space. The people are the main point, not the geography (or, for that matter, which GIS program one uses). Population density is merely a case example supporting my point—there are plenty more examples where that came from.

I am becoming increasingly convinced that a couple of questions about connectivity (also known as broadband access) should be included—not just in the ACS (American Community Survey, formerly the long form of the US Census) -- but also in the Decennial Census itself. Here is why.

Because it is based only on a sample of the population and not a full census, the ACS can only produce solid results at the census tract level (or maybe, in rare cases, at the block group level). However, as the maps on my original document show, - see - http://www.ntia.doc.gov/broadbandgrants/comments/10D9.pdf - these geographic units (zip codes) are too large to yield meaningful results in densely populated areas (e.g., most of the east and west coasts, as well as all major cities and major metropolitan areas in other parts of the country, such as Chicago and Detroit).

For broadband mapping to be a useful tool in locating, diagnosing, and stimulating constructive action and outcomes like universal access and job creation, the maps need to be accurate. Maps are most useful when a high degree of precision is achieved. **Including in the full Census a brief set of questions about broadband access is an excellent way to achieve such precision**. Naturally, the Census is only part of the equation. Data from a variety of sources are essential to any robust measurement program. Since *people* are the focus of broadband mapping, asking them about their Internet access, directly, in an unbiased manner, is not an option but a necessity.

However, collecting data directly from individuals is staggeringly expensive. The Decennial census is about to happen. No entity other than the federal government can possibly afford to conduct research on this scale. Most of the cost of the research is due to the labyrinthine and labor-intensive process of data collection. Thus, I imagine that very limited changes to an already-brief questionnaire would not, in the grand scheme of things, be a major factor. Moreover, it seems to me that the value of the information we will gather will far outweigh the incremental cost.

The Decennial Census represents such a wonderful opportunity to build the type of information base necessary to build good public policy, at precisely the time when it is most needed. To pass on this opportunity, which will not come again until 2020 - just because it is inconvenient, would be a sorry and self-injurious waste. I know that no one person can make this decision, but there is a model in the form of the legislation passed by Congress mandating that this very set of additions be included in the ACS.

COOK Report: [To put the issues on the table I asked Sara to explain her April submission to NTIA on mapping.]

There your major point is to help people understand what was wrong with the other approaches to broadband mapping. I guess the first point is that to assume there is broadband in a whole zip code, just because one person in that zip code has access, is ridiculous.

Wedeman: That's true, but there is more to it than that. If you want to be precise about it, and I've been thinking a lot about this, zip codes were developed for one purpose. They were designed to make it easier to organize the delivery of mail. Mail is, of course, one form of communication. That unit of measurement made sense for 'snail mail.' For telephones, the appropriate unit of measurement is the exchange. Your 'address' consists of your country code, area code, exchange, etc.

COOK Report: Right, like my exchange number is 882.

Wedeman: Right, and mine is 242. These are the relevant units of measurement for phones.

COOK Report: Absolutely, but they have never given that a thought, have they?

Wedeman: No, but landline numbers are linked to geography, so you could do it [measure internet access using the geography of telephone exchanges]. At least you could do it before cell phones came along and took out the link to geography. I don't know why you'd want to, but you could do it.

COOK Report: I guess we agree, then, that the late '90's FCC version of broadband availability is "junk." If we agree on that, help me understand how you make it "not junk."

Wedeman: OK. The first step in understanding the whole mapping conundrum is to establish that mapping is not just about geography. It is primarily about *people*: people living in geographic space. Therefore, the first problem is that to do mapping without ever speaking to anyone, is to miss the point entirely. The next is that if we use the wrong unit of measurement the zip code, - which is the appropriate unit of measurement for mail but not for broadband connectivity, we have compounded the error to the point where the whole thing is just nonsensical. We have attempted to measure the possibility of access while omitting the primary focus of the endeavor (human beings), and we have used the wrong unit of measurement for the medium.

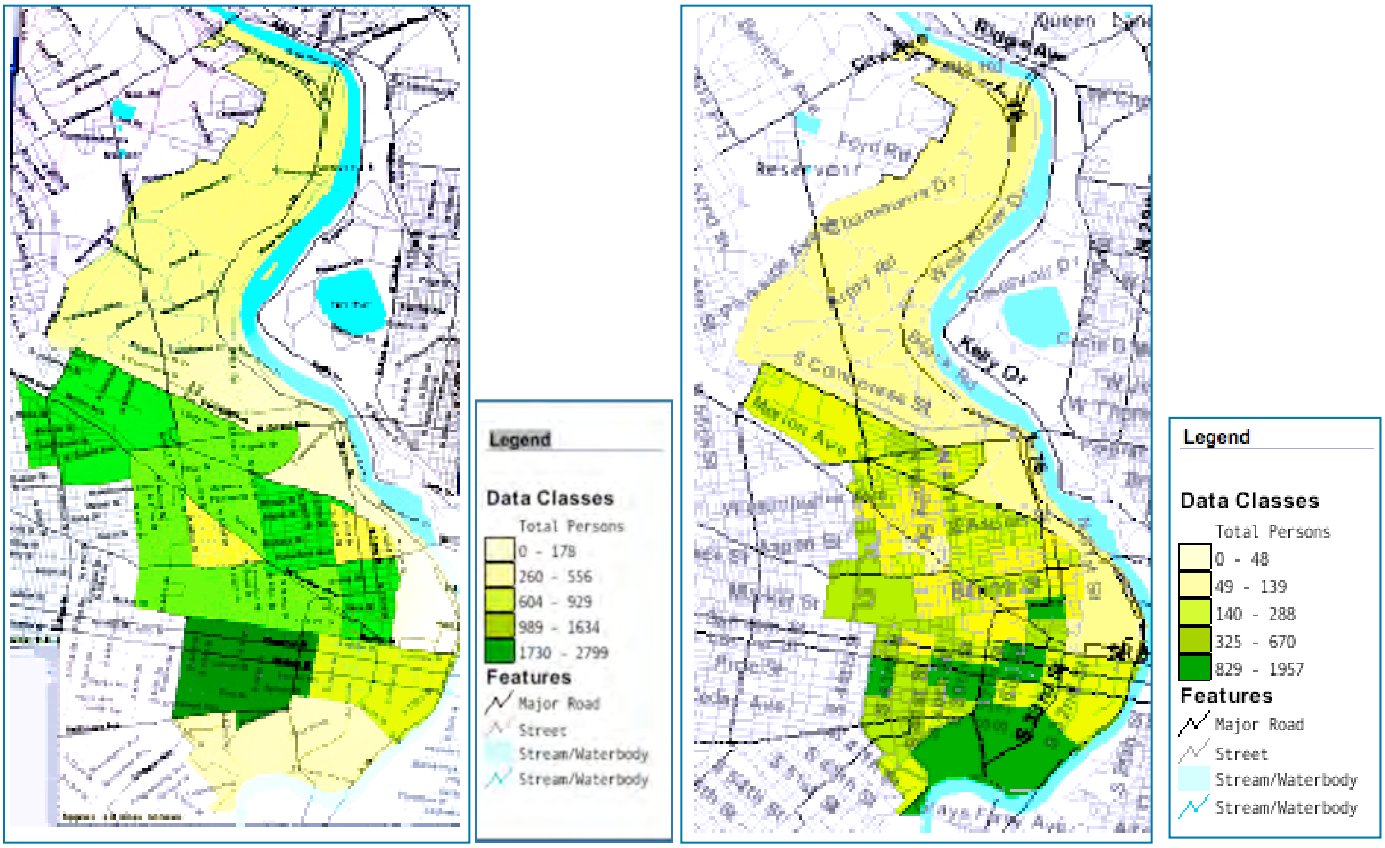
COOK Report: In other words, if a Telco says, "we provide access there" what do the people say about it? Do they have service? Is it available? Can they afford to buy it? Can they use it, and do they use it?

Wedeman: That's why the definition of "under-served" is so important, because a lot of people have construed this to be unique to rural areas. It is clear that in many of these rural locations there is literally nothing. However, what is not so obvious to many is that lots of people in urban areas don't even have phones, let alone high-speed Internet connections. They may use a pay phone, or a cell phone. Before the mass adoption of cell phones, the only service they had was provided by pay phones.

The latest version of the American Community Survey (ACS), contains a series of questions that might seem odd to wealthier, better off people rather strange. These cover topics like indoor plumbing and phone service. It's true. It blew my mind, but in large parts of the country, these questions remain supremely relevant—and, not all of these parts of the country are rural. **The whole notion that if you live in a remote rural area, you are probably underserved, but, if you live in an urban setting where one office building has its own T1 line, that means you are probably well served, is preposterous.**

Example: Zip Code 19104 (West Philadelphia - "University City")

Population statistics show a very different picture of the same place, depending on size of the geographic unit under examination.



COOK Report: What you're saying is that if an office building has a T1 line, that entire census tract is counted as having broadband access. That makes no sense. Does this take us to West Philadelphia?

Wedeman: Yes, that is part of what I was driving at. Whether you measure Philadelphia, as I did, or census tracts in California, as Rachelle Chong did, don't overlook the fact that people cluster. By accident or design, cities are often formed at strategic points along existing waterways, particularly where one or more of them come together. This in part because waterways were one of the earliest and best conduits for transportation, trade, and communication. Cities are densely populated, and typically have vastly different socioeconomic groups living in close proximity to one another.

COOK Report: Which is shown by this 19104 illustration.

Wedeman: Yes. Part of 19104 is known as "University City," because intellectual centers are thick on the ground. These include: Drexel University, the University of Pennsylvania (the city's largest employer), the University City Science Center (a university-sponsored technology transfer business incubator), The University of Pennsylvania Hospital, Children's Hospital of Philadelphia (a Tier One children's hospital ranked #1 in the nation in 2008 by the *US News and World Report)*, and the University of the Sciences, which offers graduate and under-

graduate degrees in Pharmacy science.)

Zip code 19104 also contains some extremely impoverished areas. For instance, the median household income for 19104 as of the 2000 census was $16,151 while the median for the nation was $ 41,994. However, in 19104, there are a large number of comparatively wealthy households. In fact, as of the 2000 Census, there were 2,194 people living in the 19104 census tract with the highest median income ($75,487 per annum). Amy Gutmann, President of the University of Pennsylvania, received $1,088,786 in total compensation in 2006-7. She lives in zip code 19104, about 1 block off campus (and not in that particular census tract).

COOK Report: Is the part that is really dark green where the President of Penn lives?

Wedeman: No, dark green connotes the highest level of population density, while the pale yellow connotes the lowest level—in some cases, zero. The really dark green areas could be Penn dorms, they could be Drexel dorms, they could contain high-residency buildings like apartment buildings and hospitals, or they could be places where people are very poor and are tightly crowded into small spaces with no yards or parks.

COOK Report: Harlem-like tenements?

Wedeman: Yes, and worse. West Philadelphia is noteworthy because there are extremely wealthy people and extremely poor people (as well as many in the middle) who live right up next to one another. Most cities are like that. In fact, the pale yellow parts of the map show areas with exceptionally low population density. The block level map includes a category where the population is low (16 people) to non-existent (0 people). The corollary to this is the median income is low. When there are no people, there is nobody there to earn a living. Be careful of what you average!

COOK Report: What you're saying is that you can't assume these areas (zip codes, for example) are homogeneous. In fact, they are extraordinarily heterogeneous.

Wedeman: Yes, by and large urban areas are quite heterogeneous and densely populated. As a result there are large numbers of people in each of the various socioeconomic categories. By contrast rural areas tend to be more homogeneous and, obviously, to have smaller populations.

In a sense, population density is the tip of the iceberg, and one of the most accessible ways of understanding some of the dynamics at play (because the US Census data are free and freely available). When you have high population density, it really changes the meaning of terms like "median income." The average, by which I mean the measure of statisticians call the central tendency – mean, mode, or median – is not enough.

Because there are so many people living in that shared space, a median income of say, $20,000 per year probably does not denote a "poor neighborhood. For example, in zip code 19104, there were, as of the 2000 census, 50,125 residents living in a 3.02 square mile area. This makes just one of Philadelphia's nearly 50 zip codes more populous than 25 of Pennsylvania's 67 counties, which together cover an area of 16,001.49 square miles.

Even if only .05 percent of this zip code's residents had net worths over $1 million that would mean there were 251 millionaires living in this "low income" neighborhood. Given that a large number of professors live in this zip code, including professors from the Wharton school, .05 percent seems like a conservative estimate. Simultaneously, in a rural zip code, you might have the same number

of people as live on one block in a big city. While the median income in a more sparsely populated area might be higher, that could simply reflect the low population combined with a lack of extreme wealth or poverty.

The implications of population density are enormous, in terms of understanding the dynamics of social class, and particularly broadband access. ***If you are measuring the geography and not the people, you are missing the boat by many miles. There seems to be an assumption that if the pipes are there and there's a last mile to even one building, a large swath of the population is served. That's a predictable, if wildly inaccurate outcome of a geography-based approach.***

COOK Report: In other words, if you do that, you are ignoring the people. It's the neutron approach, which assumes that the buildings are sacred and the people are irrelevant.

Wedeman: Exactly, and it's folly.

COOK Report: Is it appropriate at this point to ask, when we go from the census tract view to the block group view? Are you doing this because you want to get more granular? Is that difficult?

Wedeman: It's very easy. The information is free and freely available from the US Census. The people there are (among other things) demographers. Their job is to count, to count ***people***. Incidentally, they do not use a silly binary definition of "urban vs. rural" because the truth is it that this is not a binary phenomenon. Their categories are not based on "what I think." Rather, they follow patterns in the data, using sophisticated but well-known known statistical techniques like discriminant analysis to find reality-based break points. Based on that, they have identified seven 'stops' along the urban-rural continuum, ranging from "urbanized area" "to "isolated rural".

COOK Report: Discriminant analysis is a proper term and has its foundation in mathematical statistics, right? It is scientifically verifiable I would presume?

Wedeman: Precisely, that's right. The method is quite well established. More to the point, it should be obvious to any even marginally cognizant person that having only the two categories "urban" and "rural" distorts reality.

The US Census Features Seven Gradations Ranging from Dense Urban to Isolated Rural

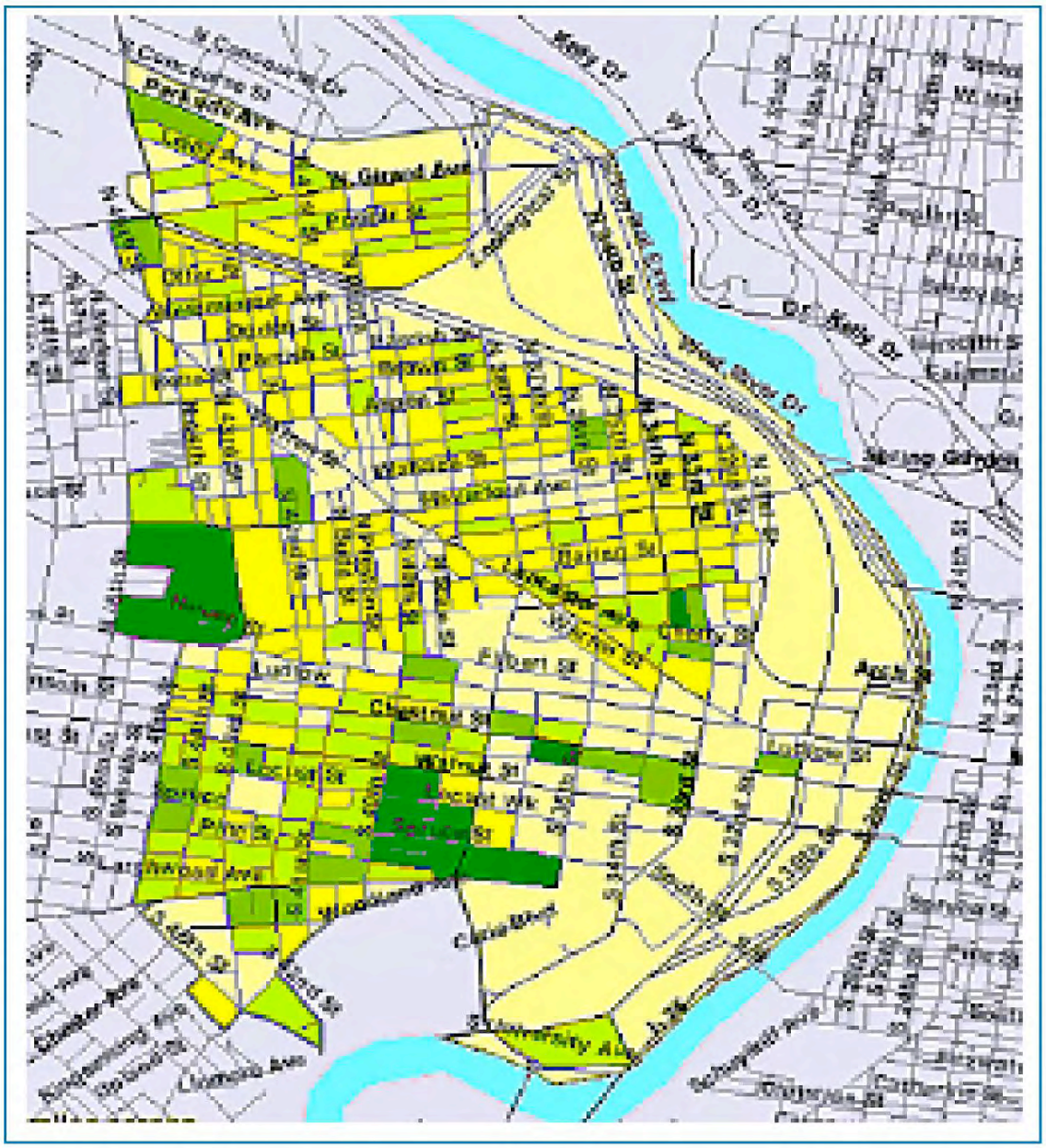
What happened to the suburbs? Where did they go? Instead of splitting the urban-rural continuum in two because they think it would be convenient, the analysts at the Census bureau used established methods to develop a system for categorizing the character of different populated areas based on uncontrolled and naturally occurring variation in the real-world environment.

***COOK Report*: In other words look at the seven gradations in the map of California at the bottom of the preceding page.**

Zeroing in on 19104

Now, show me what you're doing in 19104. You are going into increasing levels of detail. What are you trying to do here?

Wedeman: There are different scales because there are different levels of granularity. Notice the lowest category of population density (pale yellow), which differs based on the level of granularity of the analysis in question. I looked at these, because I know



Zip Code 19104: At the block group level, it becomes clear that there are just a few areas 'driving' the population statistics for the zip code.

Source US Census Bureau: 2000 Census; 100% population count

Philly. I live here so I know what they are. Well, guess what? They are uninhabited!

COOK Report: Is it park land?

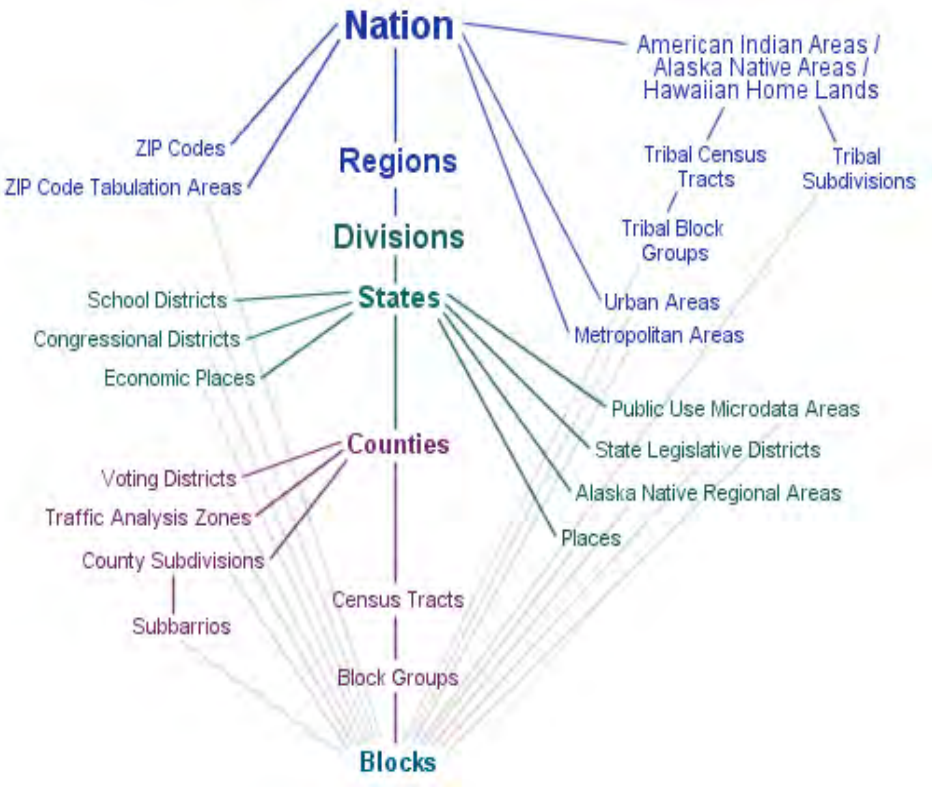
Wedeman: Yes, it's part of Fairmount Park. There's a reason for the low population density and equally low income: the largest of the light yellow areas is a piece of Fairmount Park, the largest urban park in the nation. It is actually 10 times the size of Central Park. The thing is: it's a park! Nobody lives there. Now wonder the median income is low. Most of the other light yellow areas are softball fields, city parks, etc. It would be easy to take a look at any one of them and think: "how horrible, those people must be living in desperate poverty: look at how little they live on." The point is that, when you average data over too-large geographic categories. . .

COOK Report: You are very likely to draw wrong conclusions.

Wedeman: That's right. It obscures real differences. Therefore, I started with the Census tract, which is what they used in California. Then I moved to the block group, which usually includes no more than 500 households.

COOK Report: So these are categories used by the US

Census Geographic Categories



Census. In other words, if you made a specialty out of immersing yourself in all these Census databases, it is, like reading tree rings almost, you know how to delve down into deeper and more granular levels—which is what you're doing. How many levels are there? Probably a lot more than three.

Wedeman: Yes, they are like Matryoshka dolls, nested within one another, always using the same units of measurement. Note that there are many, many levels. In addition, and I doubt many people know this, there are multiple censuses. There is an economic census, which is done every five years, and is a gold mine. There is the decennial census, which is coming up and counts every single person residing in the U.S., whether legally or not. Some other Census Bureau Studies include: the ACS, The Current Population Survey, the County Business Patterns Survey, the Survey of Consumer Expenditures, the American Housing Survey, and many more.

COOK Report: And that (the Decennial Census) is mandated by Article 1, Section 2 of the US Constitution.

Wedeman: Yes and the reason I'm arguing for putting the **broadband questions in the Decennial Census is that no other version of the Census can get down**

to the block level. By contrast, the ACS is administered to a population *sample*, on a rolling basis – every year – and that means that not only can you not get down to the block level, sometimes you can't even get to the block group level. The reason for this is that with a sample, the true population parameters are not known and the numbers that result are estimates.

Estimates always carry with them a probable band of error. Typically, the estimate must fall within the band where the likelihood of being dead wrong is low. This is called the "confidence interval." However, chances are that the true score falls somewhere within the confidence interval, but we cannot know where. This becomes a problem when you attempt to compare estimated scores to one another. If the error band is larger than the difference between the two scores, this suggests there is no difference at all, or that there is a difference but your measurement schema is too crude to detect it.

To make valid comparisons between subgroups within a population, for example age, gender, etc., you need a certain minimum number of people within each 'bucket' (statisticians call these 'cells'). The issue with the ACS is that because it is conducted with a sample, and one taken on a rolling basis, you are not likely to get sufficient cell sizes for low-incidence, under-served populations to be able to discern what is actually going on. Given the complexity of the dynamics involved in technology adoption, lack of precision and granularity in the data could lead to a situation where the change agents are forced into the functional equivalent of performing neurosurgery with a butter knife.

COOK Report: In other words, if you wanted to take zip code 19104 in Philadelphia and compare it with a similar area in Chicago, (in order to know that you are treating each equally) you couldn't do it unless you had enough people in each category in each place, at a very fine level of geographic specificity.

Wedeman: That's right, and if you wanted make those comparisons for a low-incidence population, like Asians who, at last count, made up 3.6% of the population; or Native Americans and Alaska natives (Eskimos?), who make up .9% of the total population, you might as well forget it.

There's another issue with the ACS as well. Its primary purpose is to allow the Census Bureau to drill down on some issues that would render the data collection form for the Decennial Census unduly burdensome and therefore drive down participation. Another virtue is that it allows demographers to track issues on a more frequent basis, because ten years between the taking of the full census is a very large interval, and a lot can change over that period of time. Of course, you can go back at the end of the ten years and add up all the results, which might yield enough people in each 'bucket' or cell, but the problem with that approach is the passage of time.

COOK Report: The buckets are leaking.

Wedeman: The buckets are leaking badly! This year's bucket is really *not* the same as last year's bucket because time changes everything.

COOK Report: You can make valid comparisons between similar areas of, say, Washington, Chicago, Boston, Los Angeles or whatever only if you go down to the block-level view, as on page nine above. In other words, if you are using the right tools, you can do accurate comparisons between similar areas across the country if you are able to do so on a highly granular basis.

Wedeman: Yes, and I am going to take the administra-

tion at its word that one of the purposes of mapping is to create jobs. This being the case, those who are hired to support the mapping process won't have particularly rosy occupational futures if what they gain from the $350 million in stimulus funds is an education in how to do mapping wrong. Optimally, the primary purpose of any mapping enterprise to literally and/or figuratively measure the 'lay of the land.' **Where are people well served, where are they poorly served, and where are they not served at all? Moreover, can we identify any patterns in the way services are or are not delivered, that will allow us to bring focus to the strategy for infrastructure installation and maximize the efficacy of much-needed adoption programs?**

COOK Report: The thought is, presumably, that there's some economic value for society in this.

Access to Broadband is Access to Economic Opportunity

Wedeman: That's right. As I mentioned at the beginning of our conversation, Amarty a Sen won the Nobel for his work demonstrating that famines are caused not by food shortages, but by blocked information pathways. He is the person who famously said: "There has never been a famine in a country with a free press and regular elections."

After that, he went on to study the relationship between freedom of the press, as well as other communication channels, and the wealth of nations. In particular, he found that in countries without these freedoms, entrepreneurs were hampered because they could not get up-to-date information with which to innovate. I believe this is intimately connected to the importance of the NTIA broadband initiative (and why I feel so strongly about the need to do it right).

Paraphrasing Sen, Audrey Selian notes:

> *The monopoly of or interference in ICTs [*information and communication technologies*] and media for the purpose of controlling information can be a core obstacle to the realization of the needs of a democratic society, and can be perpetrated by private and state entities alike. In this regard, it lies in the obligation of states.… "to guarantee or promote a climate of open and plural public debate, and to correct a situation in which these characteristics are absent or distorted."*

The point I take from this is that availability to all of the means for speedy communication and dialogue as well as accurate, unexpurgated information are central to the future development of any country. In this case, I am talking primarily about the United States. Ubiquitous connectivity and the enforcement of tight protections from anyone's attempts to control the availability of information, access, or both, will be decisive in enabling this country to thrive and prosper in the future.

COOK Report: Can you describe - in a clear, concise way – the relevance of Amartya Sen's work to the Broadband Stimulus program?

Wedeman: Yes, absolutely. In short, the Broadband Stimulus program is about two things: creating new jobs that pay a living wage, and increasing everyone's ability to connect via high-speed Internet access. Based on Sen's research, I predict that universal connectivity will increase the overall wealth of the United States by allowing entrepreneurs and others to innovate, better and more quickly. As enterprises are

founded and many flourish (due to increased connectivity), jobs will be created. These jobs will outlive the Stimulus program, and ultimately eclipse its cost through the value they create. That's my hypothesis.

COOK Report: Is this something you would like to test?

Wedeman: Yes, it is.

COOK Report: In other words, if you want to know the economic impact of broadband à la Sen, it's absurd not to go down to this level of granularity.

Wedeman: Yes, it is absurd. Another thing that is absurd is the notion that the Broadband Technology Opportunities Program (BTOP) should let everyone 'do their own thing,' and that the states should all be able to do the broadband census their own ways. I know politics and politicians do their best to nose their way into the Census each and every time it is done, because they hope to influence the outcome by controlling the methodology. As one of the participants in the hearings led by Bob Atkinson commented, not only is this unethical, but it has the potential to be incredibly damaging because it compromises the accuracy of the results. To let people who do not know anything about research decide how it should be done represents nothing short of an abrogation of governmental responsibility. This is research, not politics. The goal of research is discovery, hypothesis testing, advancing our understanding of reality so we can make decisions based on valid, reliable information. Meddling in the design and execution of research because you fear the outcome accomplishes only this: it destroys the credibility of the results while wasting the time and money spent on the endeavor.

COOK Report: Could you say more about this?

Wedeman: Certainly. NTIA has been asked to develop a broadband map for the entire country. Unless standard units of measurement are used, they can't get "there" from "here." You cannot do the math if the methodology, units of measurement, analytical procedures and the like are not standardized. This is not an issue of "State's Rights;" it is simply a question of being able to perform the computations.

COOK Report: Not to mention arriving at legally defensible guidelines for actions taken that could be defended as free of prejudice?

Wedeman: Yes. Different types of data have different properties. For example, there are things one can and can't do when working with categories, or ranked data where there are no zeros. Mean scores have endless problems, as do percentages. Means tend to obscure extremes, as we have seen with 'smoothed' data in previous attempts at broadband measurement. Percentages fail to take into account the base number upon which the statistic has been calculated.

For instance, 200% of one person means something quite different than does 200% of ten million people. Another issue is: what does the research mean by "96% of the state has broadband access?" Does that mean 96% of the geography, or 96% of the people? Within geography, are we talking about habitable places (excluding deserts, mountaintops)? Are water bodies included or excluded? (One would hope that the latter held true, unless there are settlements sitting on top of lakes or rivers).

All of the points listed above are reasons why the most granular data, in raw (that is, unanalyzed, with no formulae), using standardized units of measurement, must be established before the initiation of a single mapping process and need to be used across the board. We need to define our terms, and they need to mean the same thing

in L.A. as they do in Beeville, TX.

COOK Report: Because, absent this standard baseline, comparisons between places are not possible?

Wedeman: Yes, among other things.

Lessons from Rural West Virginia

COOK Report: Let's move on to West Virginia, then. Why did you choose to look closely at that state?

Wedeman: I felt it was important to look at a place that was undeniably urban (Philadelphia, PA) and a place that was generally viewed as rural (the state of West Virginia) to see if the kinds of patterns I was noticing held true for both.

Cook Report: Is this on the same scale as the other maps, with pale yellow indicating sparse population and dark green denoting high population density? The medium green location in the first slide, is that a census tract?

Wedeman: No, that's the first Congressional District of West Virginia at the time of the 2000 Census. It includes 20 out of West Virginia's 55 counties. What you see there is that they have averaged the total population of the Congressional District over all twenty counties, making it look the same. Thus, reality gets distorted. Then, I decided to look at the most populous county within the District, which is Ohio County, with a total population of 47,427 and an average of 447 people per square mile.

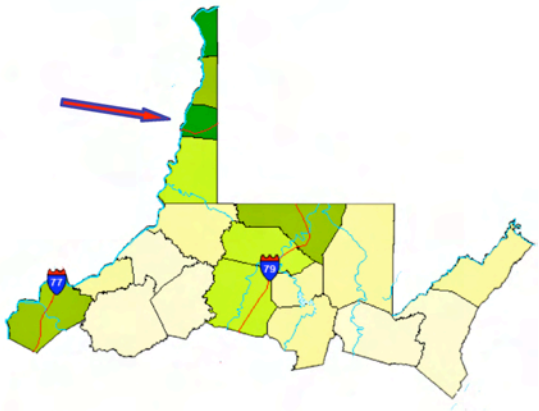
COOK Report: So, in that little spike up at the left, right in the middle of the spike, there is a small horizontal dark green stripe, which is Ohio County, Again if you know what you are doing,

Why "averages" do not make sense.
Case Study: West Virginia

Population density for the state as a whole: 75.1 people per square mile. (2000 Census)

Population density by Congressional District. *1st:100/square mile*; 2nd: 67/square mile; 3rd: 66/square mile.

Population density by county *within District 1*. **Ohio County** appears to be the most densely populated county (447 people per square mile).



Source US Census Bureau: 2000 Census; 100% population count

you could choose any other Congressional District in any other county in the country and do the same thing, right?

Wedeman: Yes, as long as you use data from the decennial Census. If you'll notice, I inserted a little note that says "source: 2000 Decennial Census, 100% population count." I did that because I wanted to make clear that it is not a sample. They counted everybody they could find.

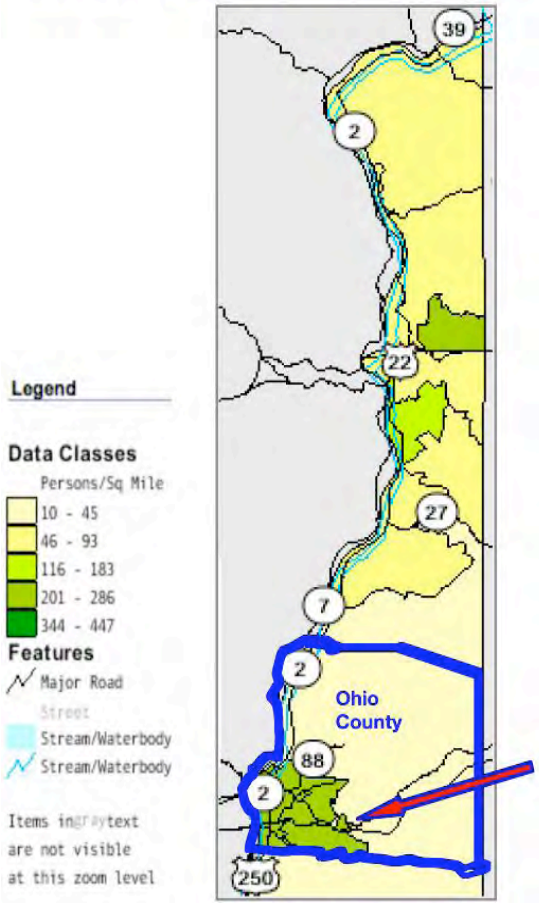
COOK Report: You've made clear that this is the Decennial Census, but why is that important?

Wedeman: It's important because not every "product" released by the Census Bureau is a true census. Some of them are surveys, based on sampling. This is perfectly fine, but it is important to be clear on the differences between a census, which is a complete count, and a survey based on a sample that is designed to be representative of a population. You can only get as specific as I have when you have counted, to the best of your ability, 100% of the population. With sampling, by design, you will get an estimate, with an error term built in. This is fine, if the sampling is done properly and any differences between sub-populations are tested for statistical significance. The primary issue is that with a sample, you can never, ever, predict the score of any

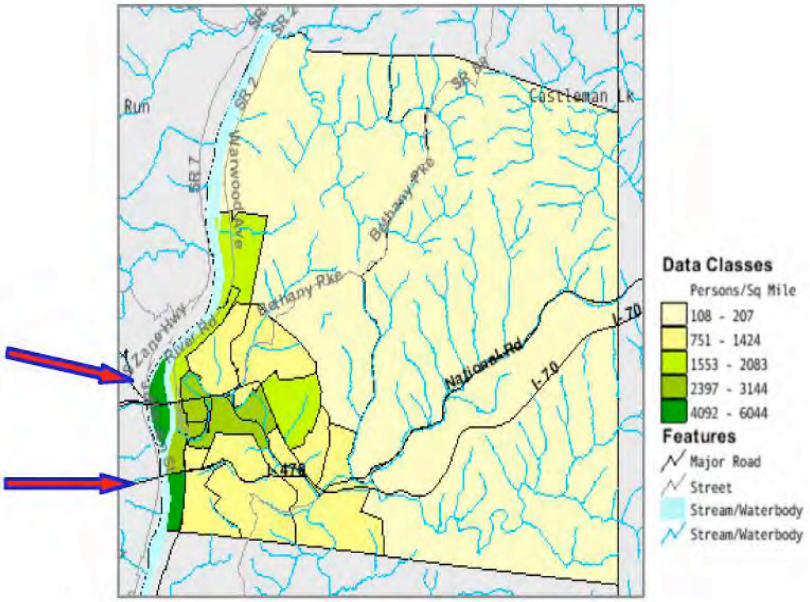
Yet, within Ohio County, only two areas are densely populated.

The rest are barely populated at all.

Ohio county by county subdivision: 1 subdivision seems to have the highest population density.



Ohio county by census tract: two tracts seems to have the highest population density.



Source US Census Bureau: 2000 Census; 100% population count

one individual. With a Census, you do not have to predict, because you know what it is.

COOK Report: What happens when you try to compare results from multiple samples?

Wedeman: The more sample data you add to the equation, the greater the error term. This means you run the increasingly high risk of having two scores that appear different, but the difference between them is smaller than their combined error terms. In other words, it is probably a fluke. For all intents and purposes, the two numbers are the same. You have no results to report. There's nothing there.

COOK Report: Ok, tell me about what you have done with the next map.

Wedeman: I decided to zoom in closer and look at Ohio County by County Subdivision, the next smallest unit of measurement. Already you see something rather surprising: this supposedly densely packed county is, for the most part, very sparsely populated. Most of the county has a population of 10-40 people per square mile. Then, when you go even closer in to look at the Subdivision by Census tract, you see, again, that most census tracts have population densities at the lowest end of the scale, with the second largest group of census tracts lying at the second-lowest end of the population density scale. There are really only two census tracts that are densely populated, and they are the primary 'causes' of the medium green color of Congressional District 1, as opposed to Districts 2 and 3.

Connecting Physical to Electronic Trade Routes

COOK Report: You're going up to a greater level of granularity as you move in closer, and what you see is that by and large, the more densely populated areas are right along the river banks.

Wedeman: Exactly! You may recall that I was saying a lot of cities were formed alongside rivers, lakes, and other bodies of water…

COOK Report: Trade paths.

Wedeman: The slide below (Arial View of the Wheeling, West Va. MSA) is from Google maps. It turns out that most of the "population density" of Ohio County exists in one place, Wheeling West Virginia, right along the Ohio River. If you'll notice, the large red arrow points to the very areas that are darkest green (that is most densely populated) on the Census map. Interestingly enough, these all fall within the Ohio River valley. On the West Virginia side, the most populated areas can also be found along the Ohio within an area contained on several sides by major creeks like Big Wheeling Creek, Long Run, and George Run. In other words, where there is a confluence of streams.

The concentration of populations around bodies of water, particularly in places where several of them come together, intrigued me. I then started thinking about how cities were originally formed as well as the relationship between naturally occurring geological pathways like rivers, communication pathways, and trade routes.

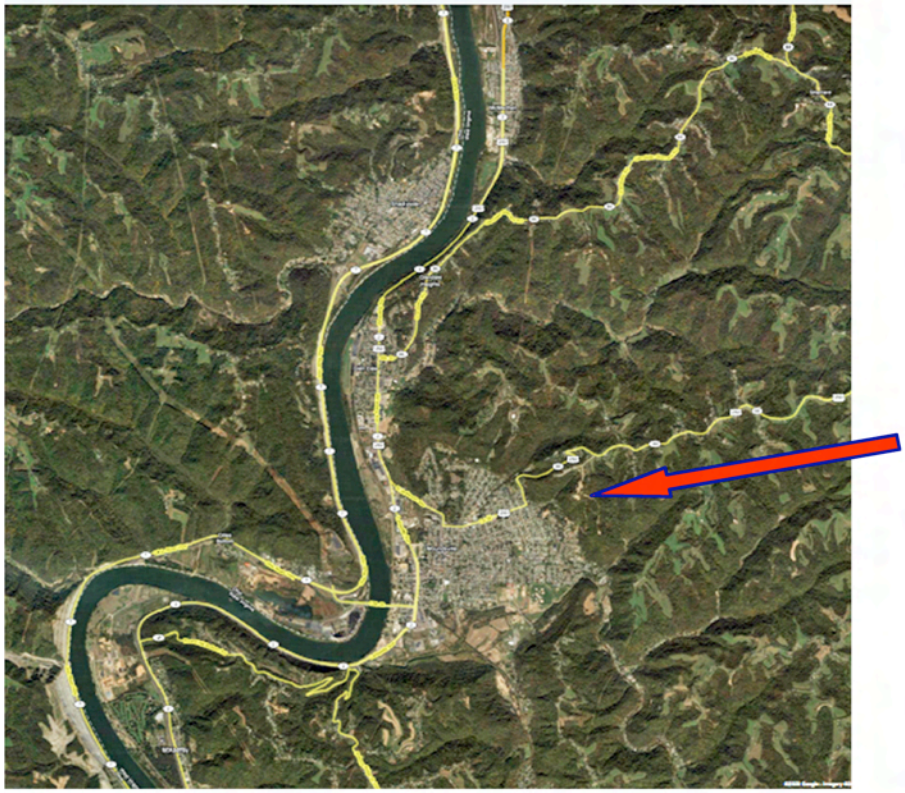
COOK Report: Let me ask a question. What meaning do you draw from the availability of good, affordable broadband overlapping with the presence of natural and man-made conduits?

Wedeman: The close linkage of trade and communication.

COOK Report: This makes sense because the Internet merely constitutes a different type of trade route.

Wedeman: There is a reason people settle in river valleys and along bodies of water where multiple 'streams' come together. First, before

Case Study : Arial view of the Wheeling, West Virginia MSA



This **small area** actually accounts for most of the population of Congressional District 1.

The subtext is that historically, urban centers have been located in river valleys, where they are protected from tornadoes, and where there is a geologic infrastructure that facilitates communication and trade (in this case, that would be the Ohio river).

Source: Google Earth

the wheel, before the horse and buggy, the train, car or airplane, the water offered the best medium for travel. It was also easier to get large quantities, heavy goods, etc. from one place to another over the water than the land. In a very literal sense, waterways made shipping possible. (Think about that any time a piece of software fails to 'ship' on time!).

COOK Report: But what about floods?

Wedeman: Note that I mention river valleys because anytime there is a river; there is a risk of flooding. However, people did not build cities on flood plains. Flat topography vastly increases the risk of mass destruction by flooding. Moreover, flat places with few trees tend to be hit more frequently and harder by natural disasters (tornadoes, brush fires, etc). River valleys have 'walls' around them, carved by the river, and are characterized by variability in vegetation and topography. Historically, they have also been more fertile than the surrounding terrain. When several bodies of water come together, multiple conduits can handle the runoff, too.

When I think about all of this, I wonder if mapping could provide some pattern-level insights that could guide the nation's strategy for the installation of broadband infrastructure. This is particularly so in rural areas where you do not have the problem of legacy telecom providers obstructing progress to maintain their lock on the market.

COOK Report: In other words, if you don't have enough money to put broadband in everywhere, do you want to think about making your choice to put in along

naturally occurring pathways and existing trade routes?

Wedeman: Yes, this reinforces the deep connection between communication and trade. In that context, if one considers Amartya Sen's work on the linkage between the free flow of information and the wealth of populations, it makes complete sense. Trade routes, facilitated by topographical protection and naturally-occurring shipping channels, are also outstanding conduits for the free and unfettered flow of information. Certainly, this has to be one of the reasons why totalitarian states have always restricted travel.

Issues of Unserved and Underserved Populations

COOK Report: What about the issue of unserved or underserved populations, rural or urban?

Wedeman: Lack of access has detrimental effects no matter where it occurs, but the dynamics that create the problem are different in rural areas than they are in cities.

This question brings up an important issue, that of how to measure the level of access, as well as the nature the obstacle(s) preventing the unserved or under-served from accessing the riches of the Internet. Many have expressed concern about bias in the construction of this measure, given that there are multiple causes for lack of access and that these differ greatly based on context.

"Under-served" is a stellar example of what behavioral scientists call a "construct." A construct is a cohesive – if largely intangible - concept. Some additional examples include: "community," "perfectionism," "brilliance," "extroversion," "introversion," and the like. These ideas resonate with people, but are wide open to misinterpretation and mis-measurement because they are intangible. It's as if there is an inverse relationship between meaningfulness and measurability.

The trick is to find ways of homing in on those elements of any construct that are simultaneously tangible and genuinely reflective of the concept's meaning. Gifted researchers know how to develop valid, reliable measures of complex but deeply meaningful constructs. Moreover, they know how to do so in ways that render them amenable to statistical analysis without sacrificing their meaningfulness. In my opinion, developing nuanced and practical operating definitions for constructs like "underserved" should be a high priority for anyone drafting the requirements for broadband mapping grants.

In rural areas, the lack of access is typically a function of providers being concerned about the cost of creating infrastructure compared with the income they expect to receive from very few people distributed across a large geographic space. In urban areas, lack of access is primarily about class discrimination. At the University of Pennsylvania, a student has the world of connectivity at his or her doorstep, but the person who collects his or her trash from those dormitories in all likelihood has none. Although adoption is a tough nut to crack, it is certainly not crack-able as long as the financial barriers to broadband access are as high as they are now. It is worth noting, however, that in both cases the drivers of the problem are economic, and this is non-trivial. If things continue to stay the way they are, and/or we do the same things we've been doing all along, but harder, stasis is the most likely outcome.

COOK Report: Coming to the last few slides, a few questions. Tell me about the slide concerning undercounting in Kansas City. [See the top of the next page.]

Wedeman: The main point here is that despite prodi-

News from City Hall

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FOR IMMEDIATE RELEASE: Feb. 6, 2009

City's appeal to U.S. Census Bureau nets 25,455 residents

City Manager Wayne A. Cauthen has announced that the City's appeal to the U.S. Census Bureau was successful and the official population of Kansas City, Mo., has been changed from 450,375 to 475,830.

Cauthen challenged the original number based on a DrillDown study conducted by Project Kansas City Urban Market Assets, which is a group that includes the University of Missouri-Kansas City Bloch School's Cookingham Institute for Urban Affairs and Center for Economic Information, and Social Compact, a non-profit coalition.

"The population of a City is important because it serves as a metric for the federal and state governments in allocating certain types of funding," Cauthen said. "I'd like to thank the University of Missouri-Kansas City and Social Compact for their work on this study."

The in-depth DrillDown study uses a multitude of city, state and commercial data records to create a more accurate picture of demographic and economic information in urban core neighborhoods.

"It's a technical matter to get the count correct, but the City also has a moral and ethical duty to ensure all of its residents are represented equally." said Sharon Sanders Brooks, City Councilwoman, 3rd District. "Specifically, the study pointed out that the 3rd District is more densely populated than thought and has the second highest purchasing power per acre in the city, which is important information in attracting new development and retaining existing businesses." Moving forward, Councilwoman Sanders Brooks and the City have worked with the Census Bureau to set up Census job testing and placement services at the Health Department and the Robert J. Mohart Multipurpose FOCUS Center.

Source: Office of the City Manager, Kansas City, MO http://www.kcmo.org/cco.nsf/web/020609

gious efforts, the Census bureau has had a very hard time tracking down and counting certain populations, particularly those that are economically disadvantaged. People who are in the US illegally, the homeless, itinerant workers, and many more tend to be very suspicious, and to fear making themselves known lest they be arrested or deported. Because of this, even the Decennial Census tends to systematically undercount populations disproportionately overrepresented among the "no access" group. Broadband mappers and policy makers need to consider this when measuring overall access to high-speed Internet service.

Another related point not covered by the article is that there is a lot of unmeasured

What is the relationship between Broadband Mapping and population density?

- Population density is an important measure of the physical and social characteristics of a geographic area. It is far more precise than is a binary distinction between "urban" and "rural," and is likely to play an important role in planning and implementing our country's new Broadband initiative.
- This statistic is very effective in illustrating why it is so important to collect data about broadband access on a very granular level. If Broadband questions are *not* included in the Decennial Census, we run the danger of missing important population characteristics when they are 'smoothed' or out of existence because we used a sample, (as do the ACS, the CBP, the Economic Census, the Survey of Business Owners, the NES, etc.). Note: there is nothing wrong with surveys or samples, but for this type of planning, a census is better.
- Since the mere presence of broadband capability in a designated location is by no means a guarantee of access, we need to be able to look deeper, to develop hypotheses about what is preventing access. This will be possible as long as questions about availability and use are part of the Decennial Census. The Census includes a wealth of information about demographics, location, and more. When combined and properly analyzed, these data will enable us to identify patterns and points of leverage. This knowledge is, in turn, vital to crafting effective strategies for infrastructure installation and technology adoption -- goals that embody the spirit and intent of the Stimulus itself.

Verizon Has Little Interest In Broadband Grants

HILL BRIEFS *Congressional Daily PM* June 5, 2009

Telecommunications The chief lobbyist for Verizon Communications has confirmed what many telecommunications analysts have speculated for weeks: The company will not aggressively pursue $7.2 billion in broadband stimulus funds. "I'm not saying we won't look at the program -- we certainly will," Tom Tauke said during a news briefing Thursday. "But right now, I don't expect that we are going to be significant players in going after the stimulus funds." Verizon and other major carriers have been dissuaded in part by regulatory conditions that Congress imposed on recipients of the grants and loans. Instead, Tauke expects state and local governments to take the lead in pursuing the money and then partner with companies that are best positioned to expand high-speed Internet access to consumers. Tauke weighed in as stakeholders face a Monday deadline to submit comments to the FCC on the creation of a long-term national broadband plan. The initiative, to be overseen by presumptive FCC chairman Julius Genachowski, will culminate with a report to Congress in February.

economic activity in cities, where transactions are conducted in cash and/or there is value created that remains unseen due to the inability of current metrics to detect it. This goes, once again, to the need for sensitive measures and for choosing precision over "smoothing" of data.

COOK Report: You're saying the same thing as the economist Hernando de Soto.

Wedeman: Yes, I am.

COOK Report: de Soto said that in Latin America, among a lot of classes, people have wealth but because they don't have deeds and aren't part of the formal legal system, they can't take advantage of what should be the equity they hold in that which they have created.

To conclude then I'm looking at your final figures. Are these intended primarily to summarize the findings from your analysis?

Wedeman: Yes. The main point is that mapping is so important. We cannot afford to have it done by people who do not know what they are doing or who do not understand the difference between a sample and a census, or between measuring geography and measuring people.

COOK Report: What you're saying, in effect, is that the decision makers at NTIA and other agencies that are involved in the mapping infrastructure initiative need to develop some criteria for what they are trying to do in awarding projects.

Wedeman: Indeed I am.

COOK Report: And are you thinking in terms of Amartya Sen-type things? I mean, if you believe Obama's rhetoric, you should, in theory be thinking about that sort of thing.

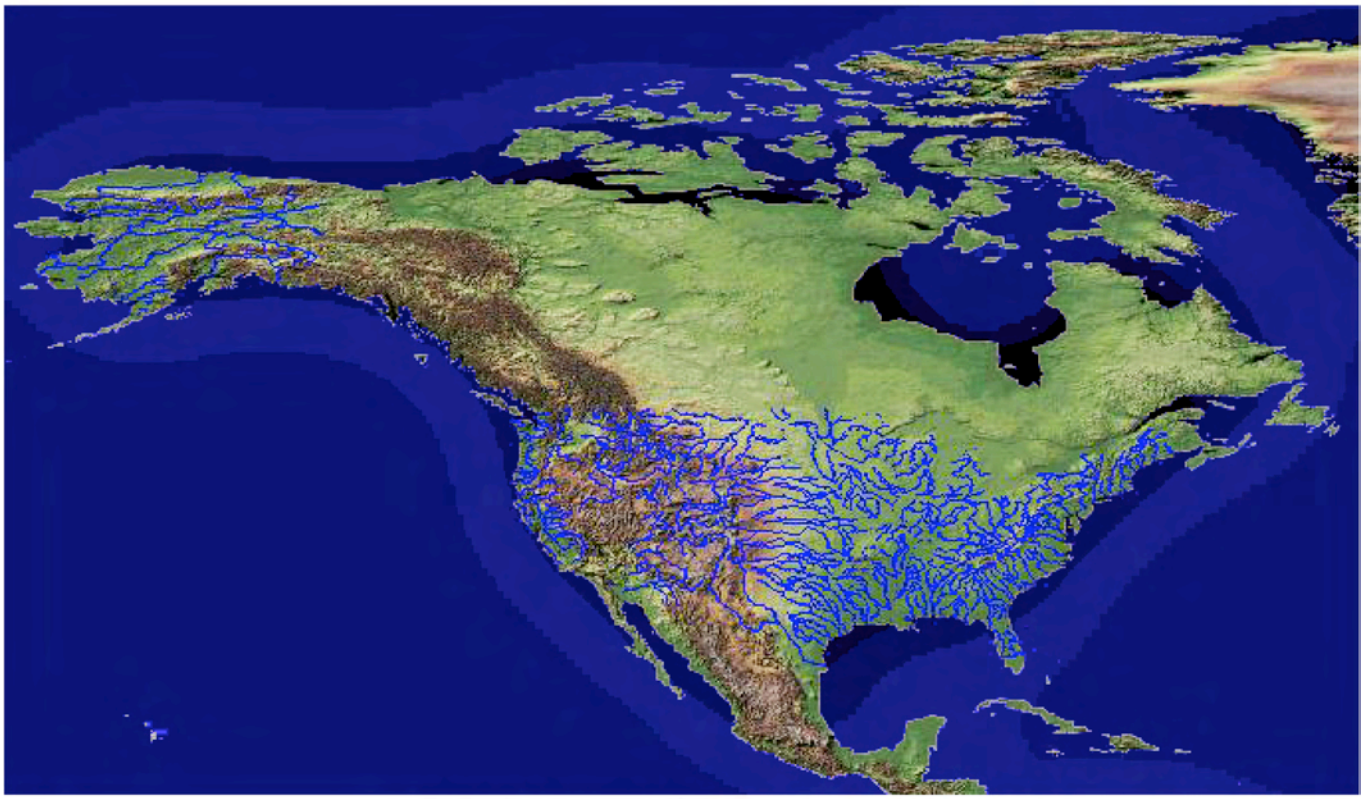
Wedeman: I am indeed.

COOK Report: In other words, how do you get some idea of where to apply X or Y billions of dollars? These are excellent points, and my hunch is that getting them better articulated, verbally, should be helpful. It sounds to me like part of your goal should be to find some people to work with. This should be a group with whom you can collaborate to develop goals and objectives, showing them how to draft robust operating definitions. That way, you can demonstrate that by doing it right they will get much more value than they would if they just adopted a hit-or-miss approach.

Wedeman: Or, if they were satisfied to receive a partial data set from the Telcos, and did not feel compelled to talk to any human beings.

COOK Report: Certainly as the *Congressional Daily* quote above shows Verizon feels no need to talk to the rest of us.

Waterways of the United States



Source US Geological Survey, 2009. http://gos2.geodata.gov

Now, looking at the above map, the one that shows so many major waterways - you are pointing out that there are a lot of trade routes that can be followed. To build on that, there are certain things you can carry over optical networks and some that you cannot.

Wedeman: Yes. I should state that my hunch about the role of waterways is a hypothesis and needs to be tested. I am not insisting that waterways are 'it.' Rather I'm suggesting we should be looking for patterns that will inform strategy development.

By the way, it is worth noting that if you have interconnected waterways and river valleys, ditch digging will be easier because nature has already helped you by digging a partial ditch.

COOK Report: That's very intriguing. You're suggesting that if we have limited resources for infrastructure installation, we should be looking at following naturally occurring pathways, like river valleys.

I think this is exceptionally valuable. This is an exercise in building a discussion, almost a primer of some of the things the decision makers in the NTIA should be thinking about as they develop this program. The goal is to educate people, and we'll take it from there.

About Our Interviewee

Sara Wedeman, owner of the Behavioral Economics Consulting Group, is a psychologist, technologist and business consultant. Over the past decade, Sara has learned how to build maps, infused with data from agencies like the Bureau of the Census, to understand market dynamics and design strategy.

Lessons for the New FCC: How Bush Telecom Policy Installed Duopoly

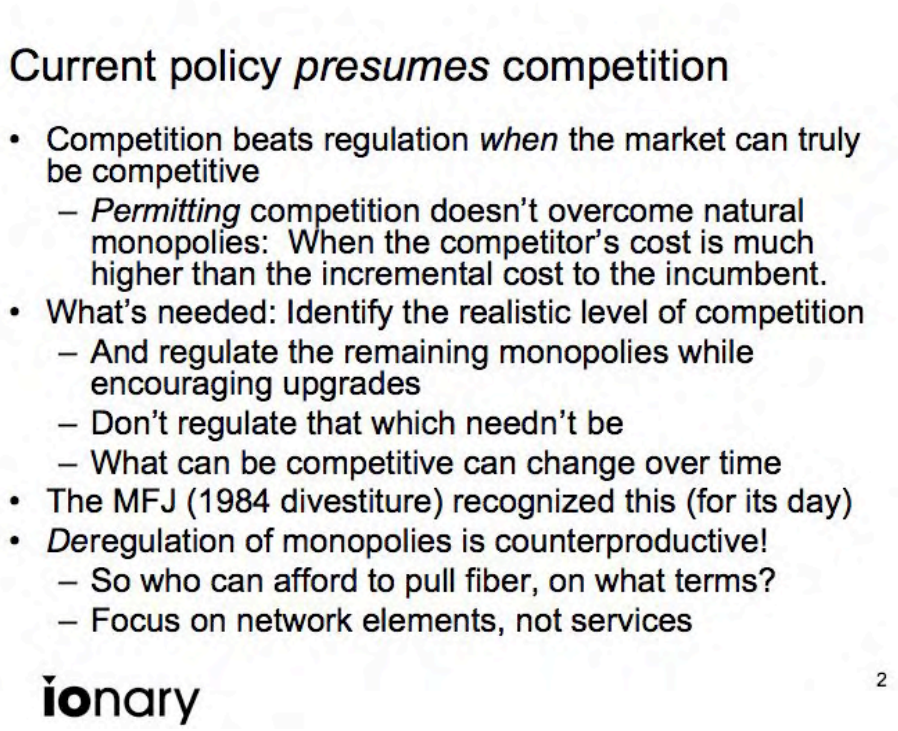
Why Divestiture 2.0 Could Benefit Everyone Except for the Executives of the Incumbents

Editor's Introduction: I heard Fred Goldstein give this presentation on March 6th 2009 at NYU in New York City at Teletruth's 25th Anniversary of Divestiture Evening. It made a lot of sense to me at the time and on April 22nd Fred, the author of the *Great Telecom Meltdown* and principal of Ionary.com http://www.ionary.com/ took me through it at a much more leisurely pace.

COOK Report: Is the whole purpose of what you are doing with this presentation is to put in front of policy makers some guidelines for a way of approaching this that can produce a policy that functions, for a change in the public interest rather then serving in a very narrow purposes of special interests?

Goldstein: Yes. The slide set actually began last December when I was trying to get an audience with Congressman Markey. At that time it looked like he would become Chairman of the House Committee on telecommunications. He had played a positive congressional role in telecommunications all the way back to the 1980s.

Markey was very much the good guy and we were looking forward to having him resume his former role when something happened and somehow he wound up on the Energy Committee giving the Chair of the Telecommunications Committee to Rick Boucher of Virginia. In my mental map of Congress, I list Boucher as D. – Verizon. When Bruce Kushnick asked me to speak at his meeting on March 6 of this year, I decided to adapt and expand on the material that I had hoped to use to bring Congressman Markey up to date.



COOK Report: So to begin: Is not the key question one of what are we going to doabout a critical infrastructure that impacts the entire economy in ways that most people do not understand?

Goldstein: That's true when you think about the average person. As opposed to people cognizant of telecom policy making, the average voter

certainly does not spend much time thinking about the exigencies of telecom. The person will have some awareness of course of his wireline dial tone service, his cell phone and whatever Internet service he actually uses.

COOK Report: Then let's start with your first slide. Take me through the problems that you see.

Goldstein: The first problem is the assumption is that we actually have competition.

When the Cheney-Rove FCC that took office in 2001, rather than examine the playing field and ascertain where competition really existed and where it did not exist and how it could help more of it come to pass, simply said **that because competition is legally authorized, it must exist.** Wherever any competition was possible at all, they believed that the market gods would inevitably create it.

They embraced a policy of deregulation on the grounds that either there is competition or, if not now, there certainly will be. A lot of this draws on the Chicago school view of the economics of antitrust that says there is no need for any antitrust law because anyone who commits a sufficiently egregious violation of their monopoly power will create an opportunity for someone else to do something about it. In other words, that in a free market inevitably someone could create a workaround.

But according to this way of thinking, John D. Rockefeller should have been allowed to keep the Standard Oil Trust together because, if he had done so, people would have invented solar powered cars in 1915. Of course this would have taken Easter Bunny and Santa Claus working together, but the Chicago School believes in them. It believes in a market fairy.

The problem is of course that competition indeed will beat regulation when and if the market can truly be competitive. Natural monopolies (remember they are economic concepts) do exist but people use the term natural monopoly to defend de-jure monopoly. ***The Bell System said we are a natural monopoly therefore you must ban competition. No: when you have a natural monopoly that does not mean you ban competition. Natural monopoly means that competition doesn't happen, even if you do not ban it.***

Mercantilism is the political system of granting monopolies and in doing so making friends of the King wealthy. That is what the Bell system has historically been engaged in. They are mercantilists and not capitalists. But in a capitalist economy having a natural monopoly means that capital cannot by itself create competition. It means that a competitor will have a market entry cost that is considerably higher than the cost for any incumbent to add to its existing capacity. For example, as long as the incumbent is there, it can drop another wire to someone's house without having to put up its own phone polls.

COOK Report: Correct because they have control of the basic infrastructure on which everything else depends.

Goldstein: Think of it this way. Natural monopoly happens when the cost of something is declining with additional unit sales of that product. When selling one more of what you already produce costs you less, that is a powerful force in encouraging a natural monopoly. Now contrast this with energy production. The cost of energy keeps going up with production. The cost of each additional barrel of oil does not decline with volume purchases.

With the physical plant of a telecommunications network you are dealing with something that has a very high sunk cost for any startup. Building your basic infrastruc-

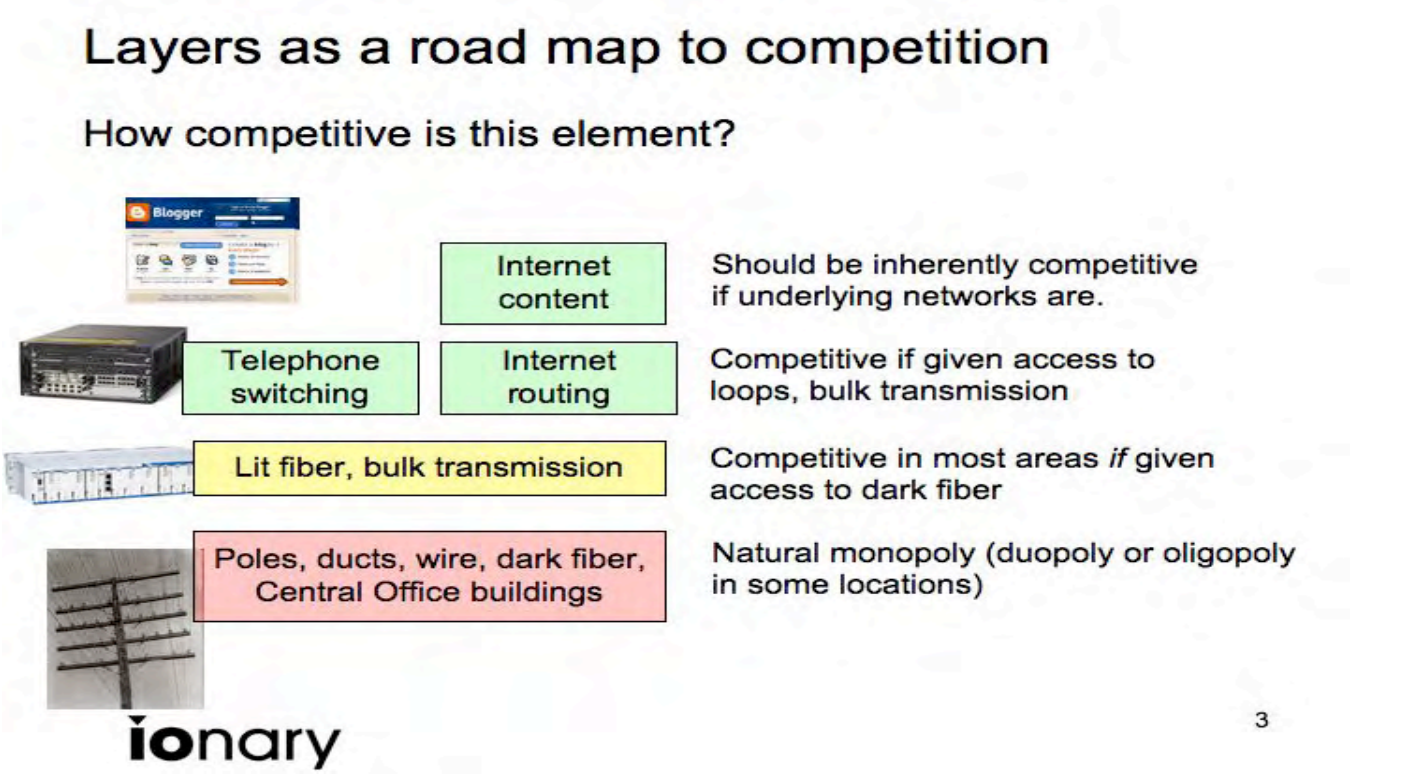
ture is expensive – once you have built it, adding to it is cheap. Therefore you simply cannot count on competition happening at every level.

Under what Conditions Is Regulation Appropriate?

Consequently, in telecom **what you must do is decide where the possibility of competition is realistic. Where it is not, you regulate. But if it doesn't really need regulation, don't regulate it.** To answer that question, you have to look very carefully at markets and market conditions at any point in time in order to define where regulation is needed. This is where Americans get things wrong. The point is to regulate market power or natural monopoly power rather than something because it fits under a label that was handed down in a ruling 50 years ago.

In 1984 we had the modified final judgment (MFJ). In other words Divestiture. In the MFJ we recognized where the natural monopoly was. Technology was evolving in such a way that long distance was becoming competitive and the natural monopoly argument no longer needed to be applied to long-haul routes. Consequently the MFJ restructured the industry and said we would create an area called the LATA. We assume what goes on inside a LATA is a monopoly. We assume what happens outside the LATA is competitive. And in this reflected the technology of 1981 when the divestiture was being designed. The reasoning here was that the Telephone Company local plant was assumed to be a natural monopoly – it would be very hard string new wires to every house and very expensive as well. And furthermore local telephone dial tone switching back then was extremely expensive by today's standards. A new electronic switch could cost $1 million. This happened at a point in time where the adoption of new technology in the form of electronic switches raised the entry cost.

Consequently, in 1981 these were the economic and technology conditions of the local markets that the MFJ was designed to meet and for which,



given the circumstances, the requirements of the MFJ did a good job of serving. Therefore looking at the conditions in the local area, we find a condition where deregulation of the monopoly would be counterproductive.

COOK Report: If you have a true monopoly and you deregulate it, you throw it open to endless fighting amongst the lawyers.

Goldstein: I would say it's even worse than that. if it is a true monopoly and you deregulate it, you throw it open to profit maximization strategies where the prices charged are not based on cost but rather based on incremental willingness to pay.

COOK Report: We've seen a lot of this recently have we not?

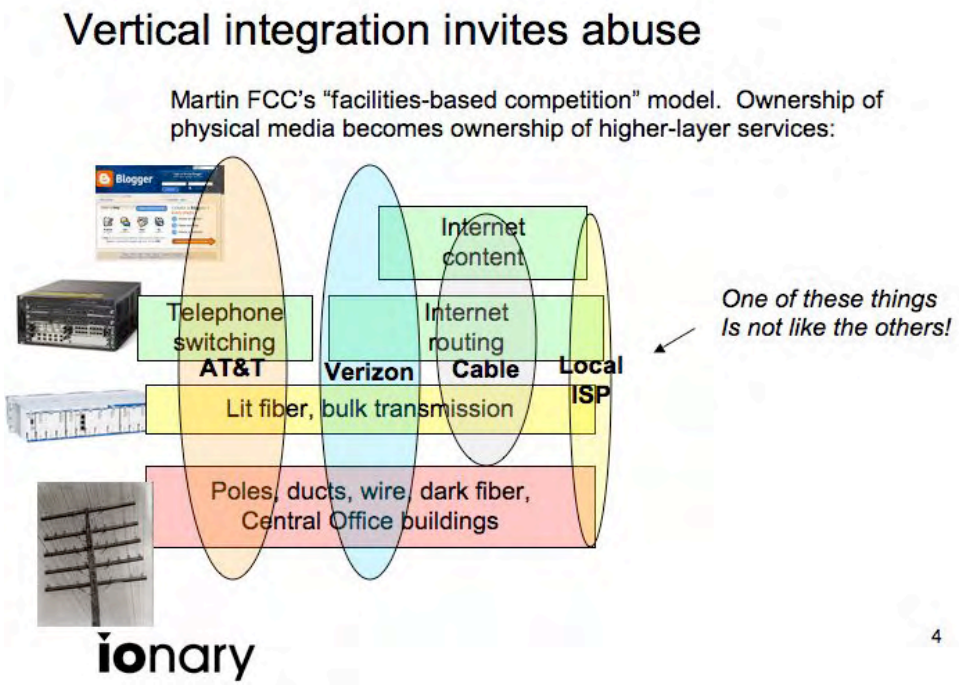
Goldstein: We certainly have. This is proof of market failure. Incremental willingness to pay means that I know its cost you only a dollar to deliver the service to me but it's worth 100 bucks so you can charge me 90 and I'm still ahead of the game. This is classic monopolist pricing. The drug companies are given a patent on their medicine to do that for a limited amount of time In order to make back their development costs. If you may die without a drug you would be surprised how much people are willing to pay.

Recognize Where Natural Monopoly Exists

But 25 years after the modified final judgment, if we still have to worry about monopolies existing in telecom, we should focus on network elements and not on network services. The network elements are the natural monopolies. Services are what you do with your network elements.

Layering therefore offers a roadmap to competition. But when I say layering let me be clear that I am not referring to protocol layering of different protocol stacks. You must look at each layer and its elements and decide how competitive they are. At the bottom of the natural monopoly layer are the poles, the ducts and the wire, the dark fiber, and the central office building. With layer one you are talking about a natural monopoly. It means that you have no real possibility of entry here because the cost is too high. You have a duopoly rather than a monopoly because the cable companies entered at the same time with a different technology in making their basic layer one network build.

The capabilities of the technologies came to overlap. This was a happy accident that the FCC actually may have foreseen. The FCC during the 1970s made a rule that cable companies could not function as telephone companies within the same footprint Except within rural



areas where there were so few homes per mile that no cable company would enter. This is why Bell Atlantic couldn't buy TCI when they wanted to and why MediaOne had to spin off some of the properties within its footprint. they recognized that a duopoly would be better than a monopoly.

On top of a natural monopoly layer then is an "in between layer" of lit fiber and bulk transmission. And on top of that are he layers of routing switching and content

COOK Report: Well the yellow band is really an interface between the area of natural monopoly and the area of competition yes?

Goldstein: In some circumstances you could say that it is a natural monopoly. In some places you actually do need it. The top layers must get it. Internet routing and telephone switching to work have to have access to the lit fiber. Is this competitive? Well yes it's competitive between carrier hotels. And between major buildings in downtown markets.

COOK Report: And if the services, as represented by the green boxes, don't have access to the fiber they can't be competitive. Right?

Goldstein: That's right. Services have to have access to lit fiber to be competitive to do what they need to do. Except that there are some places like fiber to the home where lit fiber is still essentially a monopoly. Now if you can get dark fiber, it can be lit competitively. Basically that area in the middle is competitive depending on where it is and whether or not you can have access to dark fiber. You see some of the Bells actually had unbundled dark fiber elements that were competitive for a very short time before the unbundling requirement was taken away by the FCC in the 2000 -2003 time frame.

COOK Report: I don't think many people knew there was such a thing.

Goldstein: Two things. It did not last very long and it wasn't very useful because the unbundled elements had to be an existing facility. You could not tell the phone company pull me a new dark fiber through such and such conduit. Because it was only an element from about 1998-2003, there were not that many places where it existed.

COOK Report: Interestingly enough this is precisely the time that in Japan because the government was the main share holder in NTT it ordered unbundling. NTT complied giving rise to Yahoo Broadband and transforming the Japanese telecommunications landscape.

The Fiction of Facilities Based Competition

Goldstein: That's right. It was a very different policy here however. The element policy in the US was always restrictive and really intended to cover the existing copper loops on the poles. And then just to clarify things they took away dark fiber as an unbundled loop in 2003.

What the Cheney Rove FCC gave us here was vertical integration which invites abuse. They christened this new regime as facilities-based competition and basically said if you want to compete with the newly entrenched facility as an Internet services provider you had to own the wire on which your services ran. Now if you happen to be AT&T or Verizon this was very nice because, of course, they were your classically integrated vertical monopolies.

Kevin Martin tried to ignore the telecom act and restructure of the industry around to the way it existed in the 1970.

COOK Report: Well as you point out in your slide, one of these things is not like the

others. You say you did have a vibrant ISP industry when the Cheney-Rove regime came to town because the cost of entry was not that high and smaller new companies could gain access to network facilities. Under Martin's regime players had to own the wire and the only players who did not own the wire where the local ISPs so they were out of luck.

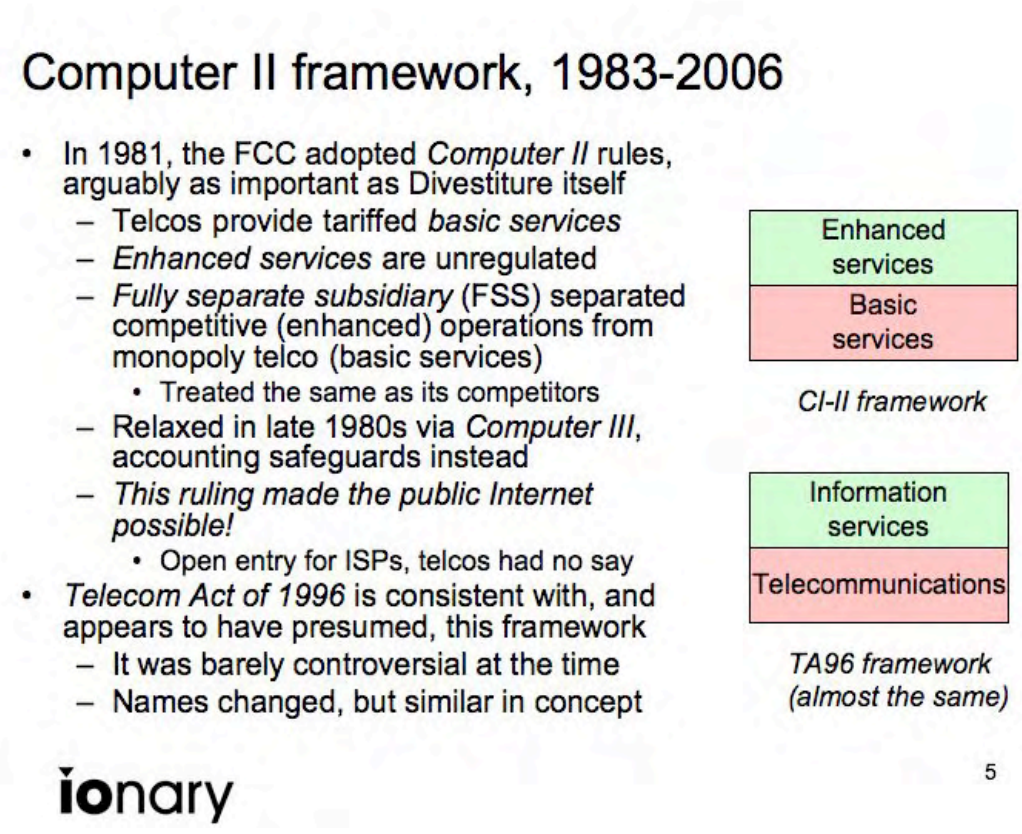
Goldstein: That's correct. **The FCC took away common carriage or what is known in Europe as bitstream. And the fiction was that every ISP would get out and hang up its own phone polls or trench the street.** Of course that required the Easter Bunny and the tooth fairy to use that tooth drill on those streets. This fiction then is why some people seem to believe even now that the facilities-based competition is somehow better. In the world of a narrow definition – in a CLEC sense - facilities-based competition refers to anything other than total service resale.

A CLEC would be referred to as a facilities-based competitor if it were a UNE platform CLEC which meant simply that it would be reselling purchases of network elements rather than purchases of services.

COOK Report: And for transitional amount of time lasting from 2002-2005 you could do that. But then the FCC closed that door as well.

Goldstein: Yes. The FCC ruled against it in 2004 and gave it a year to disappear in 2005. It had started around 1998. This was a UNE platform. But then there was also the UNE loop which was really facilities-based. With the UNE loop the CLEC owns everything except the wire which is perfectly fair because the wire is a natural monopoly and switching no longer is. A facilities-based CLEC that rents the wire from the incumbent but owns the switch seems to me to be a fair use of the term.

The problem is the term "facilities" is considerably abused. When you use the "facilities" to mean anything on the one hand and everything on the other, you abuse the word "facilities." You then say "yes, but they don't own their own facilities." Consequently you get into situations where in some cases facilities-based competition is taken to mean that the competitor must own everything while in other cases facilities-based competition is taken to mean that a competitor



owns something.

COOK Report: So what you're saying is that under the first Bush administration the definitions changed all the time?

Goldstein: They would use whichever definition was most convenient to them at the moment. It's nice to have many different meanings for a word so that when you're making rules you can take the particular meaning that means what you wanted to mean – no more no less as the old saying goes.

COOK Report: In other words you choose the definition for the particular objective you wish to achieve according to the particular aims of your client and in a different case pick another definition?

Goldstein: It gets worse than that. Sometimes in the same document you will have different definitions.

Let's go back to the framework of Computer II which was in effect from 1983 through 2006. In 1981 the FCC adopted Computer II. I have suggested all along that these rules were at least as important as Divestiture in restructuring the industry. Now back in the 1984 timeframe I was giving some talks on the rubber chicken circuit about Divestiture. I would say that the FCC had done Divestiture and Computer II which I said was likely more important than Divestiture.

Computer II divided the phone companies into what we would now call functional separation. Under computer II, the telco provides under tariff so-called basic services. But the telco may also provide unregulated enhanced services.

COOK Report: Basic services would be dial tone?

Goldstein: Dial tone, but also leased line services. In short what many of us now call bitstream services. Basic services could go up the stack as high as X.25 and frame relay. It could not go as high as IP. And that is to say in concrete terms of the protocols available in that era. In order to operate in the enhanced services space, the telcos had to do so through a fully separate subsidiary. Such a subsidiary had to be treated the same as a competing corporation. It had to have separate people -- in other words its own employees. It had to treat the subsidiary the same as it would a competitor. The subsidiary would have to have separate facilities, separate buildings, separate sales force and separate technicians.

COOK Report: And from what we know about Verizon FiOS at this time, Verizon FiOS could not meet the qualifications you just described.

Goldstein: It could not. The Bell companies however back in the 80s did have fully separate subsidiaries. They had them to sell PBXs for example. Under computer to the Bells were only allowed to sell terminal equipment under the fully deregulated and separate subsidiary. On the other hand, Nortel was a very big vendor PBXs and NYNEX was a Nortel distributor through a subsidiary that was fully separate from NYNEX the phone company.

Now in the late 80s the FCC relaxed Computer II with a new ruling called Computer III. Computer III did away with the fully separate subsidiary rule. Instead the ILECs were allowed to use accounting safeguards. It now became a regime of so-called separate finances where the accountants kept track of time and effort spent on competitive technologies while the same salesmen could sell and the same technicians could install.

COOK Report: I'm sure this was done under the guise of an argument for efficiency, but what does it say about allowing the fox into the henhouse?

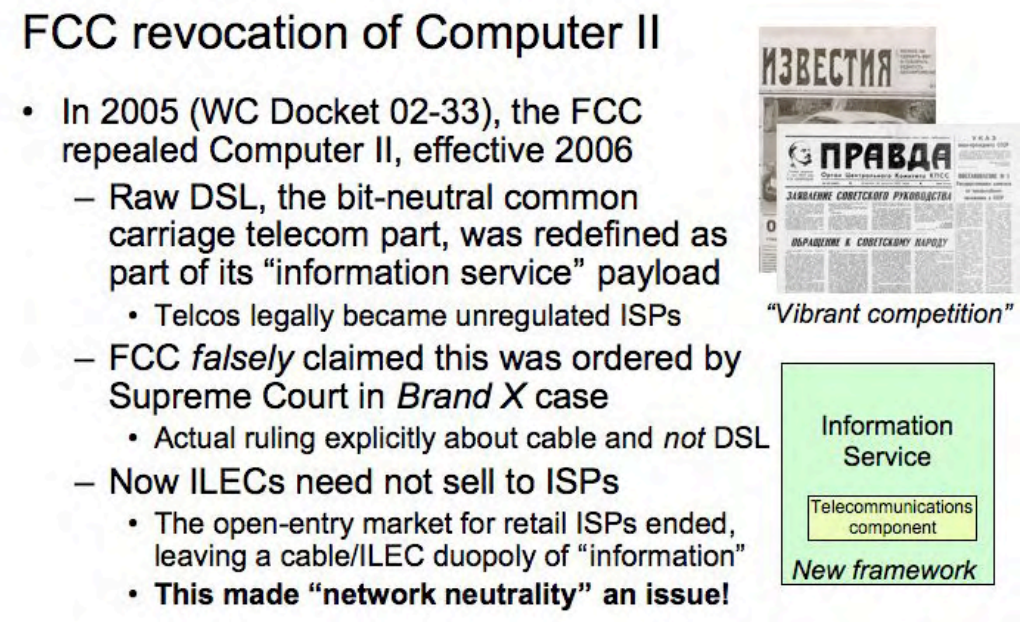
Why Computer II in 1983 Made the Internet Possible

Goldstein: Indeed I'm sure the Bells have excellent arguments about how much money they would save and of course they would save some money. But at the same time one should be asking the question of how do you value consumer welfare? Consumer welfare is more than your largest vendor saving itself money.

I want to point out that Computer II made the Internet possible because it made business viable for the ISPs who under Computer II are ESPs (Enhanced Service Providers). ISPs could purchase basic services and use them for their own purposes in a way over which the telco could exert no control. The telcos were selling to the ISPs leased lines or frame relay - both of them as basic services. There was another ruling in the 1970s. It was called sharing and resale and it was significant as a foundation for this later ruling in that it allowed to separate enterprises to purchase a leased line between them under common carrier criteria. Prior to that the ruling had been that the leased line could only be used for an Enterprise's internal purposes.

When we got to the Telecom Act of 1996, the idea was to increase competition. Since Computer II and Computer III were the law of the land – although they were just an FCC ruling and not a statute -- they were not even controversial. People expected them to remain on the books and consequently the telecom act of 96 built on that framework. It had definitions of telecommunications and information services which changed the wording just a tiny bit. In the 96 act definition of information services was very close to that of enhanced services. Except in that information services don't necessarily run over telecommunications services (which is a legal term of art), it runs over telecommunications which need not be provided on a tariffed basis.

COOK Report: Is this nuance the slippery point that allowed the tectonic plates to shift even further?



"Vibrant competition"

Goldstein: It probably was. And it probably was not even meant to do that. But it was taken that way. It really was an almost invisible change but it did turn out to allow some slipping and some unforeseen sliding. It was somewhat like that 51% rule in New Jersey which was meant to define an ILEC but which was then reinterpreted in such a way as to say: all we have to do is redefine our market share and then we

don't have to pay any tax.

COOK Report: And, as the technology changes, the changes themselves create opportunities for lawyers to take existing law and, by using new technologies, fashion loopholes that have the result of subverting the intent of the original legislation.

Goldstein: That's right. The 96 telecom act moved in the line of what was considered to be competitive. We no longer expect a monopoly in local services and therefore we are requiring states to permit local exchange competition. The key provision of the 96 act was the authorization of the intra state competition. It did this because the technology workings of the local area need no longer be treated as a natural monopoly and regulating it as though it were a natural monopoly was creating regulatory friction.

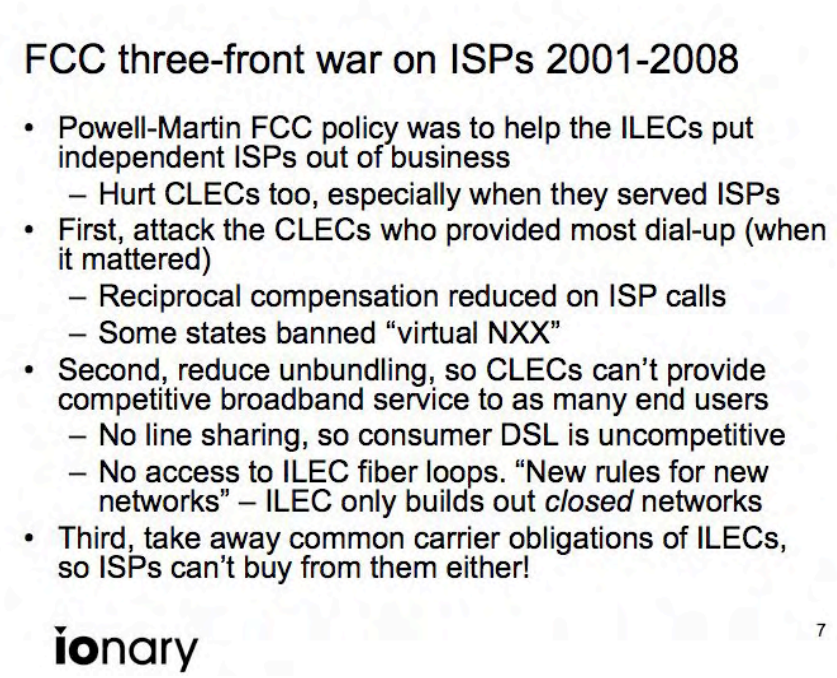
The major change in 96 was to allow CLECs to exist nationwide. The 96 act mandated unbundling and mandatory interconnection between the CLEC and the ILEC. But let's move ahead to where the really serious problem arises with the FCC's revocation of Computer II.

Revocation of Computer II – FCC Moves Against the Internet

In 2005 the FCC repealed Computer II to take effect in 2006 on one year's notice. They now concluded that raw DSL service, something that under Computer II had been a basic telecommunications service included in the special access tariff would no longer be treated as a basic telecommunications service. An ILEC may provide it. Consequently ILEC DSL is no longer a basic service. Verizon Online as the ISP resides on top of Verizon the telephone company that provides basic service to ISPs including Verizon online. But we now go a step further and Verizon Online, as the information service, in effect owns the wire. This service is provided entirely by Verizon online and so the DSL technology on which competitors rely is no longer open to them under tariff. This means that Verizon can charge anything it wants to a former competitor – for example it can set its wholesale prices higher that the retail under its own Verizon Online brand.

This move by the FCC redefined telcos as ISPs. The action was a circular definition because an ISP was formerly an enhanced service provider but now the new enhanced service provider is not enhancing anything it has been rewrapped in such a way as to enfold and encompass the basic monopoly service.

COOK Report: They were moved into information services as still vertically integrated monopolies and when they were moved there, the



move freed them of their former regulation including basic service tariffs obligations and UNE requirements. They were now legally free to exploit their vertical monopoly. Given Wall streets desire for shareholder returns, they promptly did this and the *Pravda Izvestia* duopoly shown in your slide above was born.

Goldstein: That's right. Basically it allowed the monopoly over the physical wire to extend all the way up through the content level.

COOK Report: And they did it in such a way that pulled the wool over people's eyes who did not look at it very carefully or examine closely what was going on.

Goldstein: The ISPs complained, but the general public didn't get it because the Bells did not break their access to things like World of Warcraft servers. ITunes still worked over Verizon Online but Verizon Online customers did not have the variety of choices that was once there.

It was *Izvestia* versus *Pravda*, the cable company or the telco, a vibrant duopoly.

COOK Report: To someone with my background those two newspapers are very appropriate. One was the paper of the Russian party the other the paper of the Russian state.

Goldstein: Yes as if there were a difference between the two. When you only have two providers, the competition gets very cozy. The market dynamics of the two-provider environment are very different from the market dynamics of an open environment. It gets rid of the most egregious abuses and therefore is not as bad as a monopoly but it will never create the types of service differentiation competition that an open market would create. It creates some price competition but it is the service competition that really suffers.

Brand X not Related to Computer II -- The FCC Three Front War on ISPs

The FCC falsely complained that they had to revoke Computer II because the Supreme Court, so they said, ordered it in the Brand X Case. This was a flat-out lie. I have read the Brand X Case which simply affirmed the status quo namely that cable companies were not phone companies and that cable companies were not common carriers. They had never been common carriers and did not need to become common carriers if the FCC chose not to make them common carriers. And in fact, under the Telecom Act of 1996, the FCC might not have been able to make them common carriers. The Brand X decision very clearly stated that it was not making a statement of any kind about the regulatory treatment of DSL. And the FCC turns around and says "ooops" the Supreme Court has just ordered us to de-tariff DSL. In doing so they were flouting the letter and spirit of a Supreme Court ruling.

What surprised me was the Democrats on the Commission Cops and Addelstein believed this. When Martin made this loud proclamation, the two Democrats went along with it. One has to sincerely wonder whether they read the decision. As a result of the ILECs no longer have to sell to ISPs. Consequently there is no longer any open entry for Retail ISPs anymore. You have a duopoly of information providers and as a very direct result of this network neutrality became an issue. The phrase had not been coined prior August 2005 when Computer II was revoked.

What we are dealing with now is the FCC's three front war on ISPs. FCC policy under Powell and Martin was to help the incumbents put independent ISPs out of business. CLECs were hurt as well and especially so when they served ISPs.

Front number one was to attack the CLECs who provided most of the dial-up and this was back when dial-up still mattered. You had by means of the 0007 rule the severe reduction of reciprocal compensation on ISP calls and you had some states banning outright virtual NXX which is foreign exchange service.

COOK Report: NXX allowed you to set up a local number that could be dialed without a full charge and that local number would connect the call to a bank of terminal servers or modems that would otherwise have been a long-distance call?

Goldstein: Yes and when some states started messing around with this in rural areas it meant that only the incumbent phone company could provide dial-up Internet service.

The second front in the war against ISP's was to reduce the availability of unbundled network elements. Therefore CLECs could not provide competitive broadband service to as many end users. They took away line sharing so that consumer DSL became uncompetitive. Under the line sharing rules that had gone into effect in the 1990s, a CLEC could lease the high frequency portion of the loop - that is they could superimpose DSL over dial tone - for the same price that the ILEC charged itself under the computer three imputation rules. The Bell charged itself zero. Therefore the CLEC paid zero. Line sharing said the CLECs could share the line without paying anything. It was a sweet deal. The FCC took that away entirely. Rather than putting a price on it, they simply said you can't do it.

COOK Report: And they could take it away because the CLEC was dependent on the ILEC for access to those lines.

Goldstein: That's right and, if you are trying to compete with $25 a month ILEC DSL, you cannot afford to lease an unbundled loop for 15 or $20 a month when your competitor is not paying anything to put his DSL signal on top of the basic loop service.

COOK Report: This meant that you could no longer use a single line to provide both voice and Internet if you were a competitor. Right?

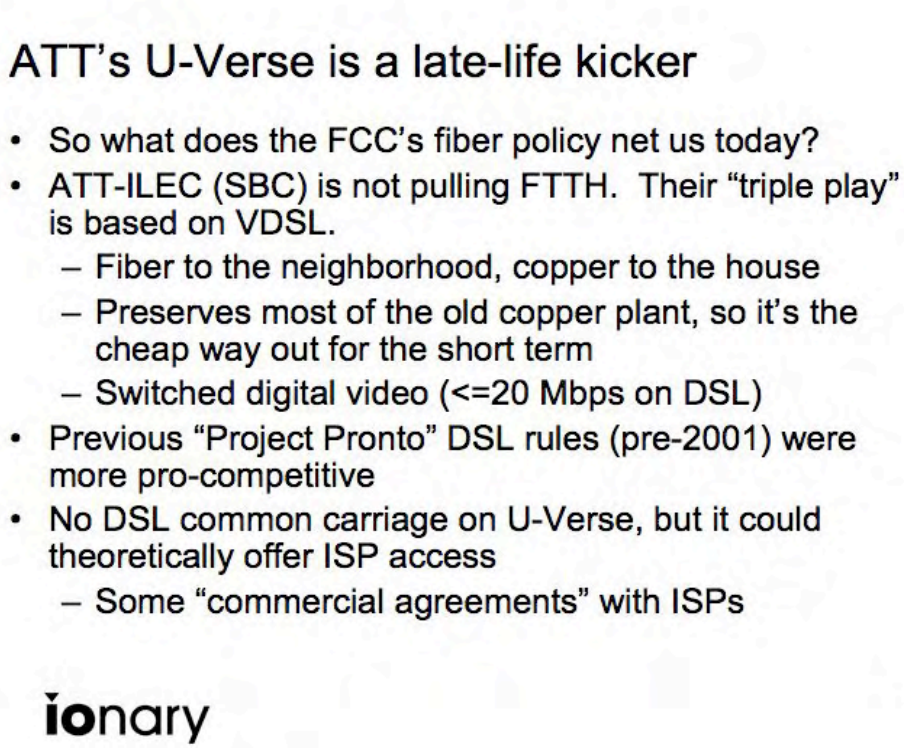
Goldstein: You could if you were providing dial tone. In some cases there were ISPs who became CLECs in order to be able to provide both voice and data like the Bells and they hoped to survive. But doing this required capital and required that the unbundled loop be cheap enough. Today there are some places where the unbundled loop is $10 a month while, on the other hand, I currently have one client where I'm helping him put in DSL with the unbundled loop set at $135 a month. Fortunately this client is able to get a commercial line sharing agreement for a much lower price than that and they use that agreement to run their DSL. It's under a non-disclosed contract so I cannot announce the price but I can say that it's not outrageous. But it's entirely at the whim of Verizon to allow that. And the same for AT&T to allow that or not in their territory.

Another change in the rules was no access to the ILEC fiber. One of that catch-phrases that they bandied about – and this is the kind of thing that the stink tanks come up with – was *new rules for new networks*. As if the telecom act of 1996 were intended only for backward looking facilities. The telecom act regulated networks in place on the day of the passage and it said ipso facto that any networks built since then were deregulated. That was the stink tank point of view which would be kind of weird if it were true because the Communications Act of 1934 certainly applied on a forward-looking basis for many decades until it was updated by the act of 96.

COOK Report: So FiOS was built as a closed network and Verizon had made it very clear that it would build only if FiOS were accepted as a close network. Verizon said in effect they needed a change in the rules in order to justify the investment for their stockholders and the FCC obligingly replied "of course we will change rules."

Goldstein: If the FCC had been steadfast and said: "look - here are the rules and they are not changing. The rules allow you to make a profit. We are not regulating the price of your enhanced services. You can charge what you want for your fiber services including a wholesale price that is just and reasonable. You can make money on it except that you have to provide it to others on a wholesale basis." In this case Verizon quite likely would have gone ahead and done the build anyway. But by putting on this charade that we will only do this if you deregulate us, they allowed the FCC to use this as cover to deregulate. Verizon then did a very fast build as a political show. Not a big build, but a fast one in very visible locations. This state capital here like Trenton for example

Verizon did a very nice little dance and said they deregulated us so we built. But at the same time they went to Wall Street and said "yeah we know the economics of FiOS



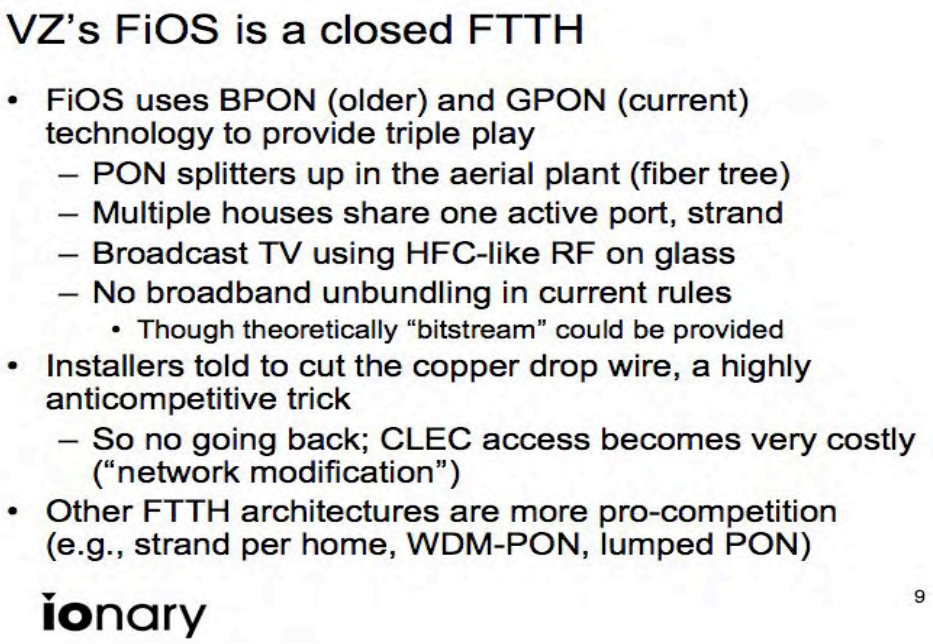
are not rarely really very good but don't worry we are not going to spend that much on it. They were speaking out of both sides of their political mouth and in the era of 2005 that was entirely normal.

The third and final front in the war against ISPs was to take away the common carrier obligations of the ILECs. We choose to say it was taking away computer II so that the ISPs cannot buy from the ILECs. The CLECs are unable to provide DSL to ISPs and the ILECs won't provide it. The ISPs now really find themselves shutout.

COOK Report: Under these conditions what kind of independent ISPs can exist? Wireless obviously, where those conditions are right and where the ISP gets affordable transit and maybe some kind of overbuild in very rural areas where the same conditions apply. Anything else?

Goldstein: You have some locations where there are still accessible third-party fibers. These are mostly business locations that can lease from a competitive access provider like Level 3. You may have mid mile problems in getting transit bandwidth to an Internet exchange point but in the last mile you also have two separate and serious problems.

Retail subscribers in the last mile must either be wireless, if you are in a fortuitous location, or by DSL if your subscriber is near enough to a central office that has DSL

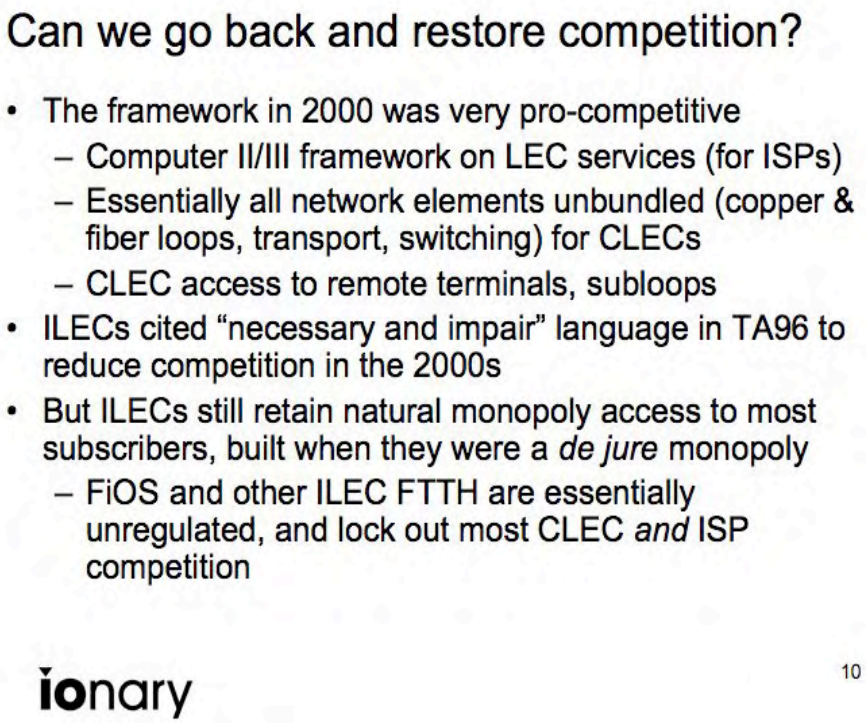


still reachable on the direct copper loops (and those loops are going down in number with every passing month). Third-party CLEC DSL still exists in many core downtown locations. In such locations business price unbundling for DSL still applies. The Covads of the world for example. Also there are still some commercial agreements that the ILECs give some ISPs on short-term to medium-term contract basis which appears to be for regulatory cover as much as anything else - allowing the existing ISPs to continue to serve some number of customers. But this is on a commercial basis with no guarantees and no rights. Some of these ISPs carry on by paying whatever the Bell wants to charge and it gets to be a less and less competitive ball game for them over time. For example the typical rates that Verizon offers for its wholesale service called Info Speed are what they were 10 years ago. This of course is what they offer their competitors while on the other hand they have considerably upgraded their own service. Competitors get access to their old DSLAMs.

AT&T U-verse – a Late Life Kicker and FiOS Closed FTTH

Let's take a quick look here at AT&T's U-verse. I call it a late life kicker because they can still get more mileage out of their old copper without having to spend the money that Verizon is spending.

AT&T does not pull fiber to the home but rather only to the neighborhood using a VDSL based approach. Because it preserves the copper plant it is cheap in the short term. Having the capability of only 20 Mb per second it is able to provide only switched



digital video. That can provide some number of video streams depending on the video resolution, whether it's high definition or not, and where the house is physically located. In effect for AT&T this approach is buying time, assuming the cost of fiber comes down in the future.

There were more pro-competitive rules under SBC in the pre-2001 era for a Project Pronto that would have allowed SBC to put a very large number fiber terminals in the field. Under the Bush FCC those rules were withdrawn and U-verse was done under the much more ILEC friendly rules of the Bush FCC. U-Verse does not provide common carriage in the way pronto did. U-verse could offer some ISPs access and there are some commercial agreements but their number is quite limited.

FiOS is a closed fiber-to-the-home project using the older BPON and more current GPON technology to provide triple play. Verizon does this in the most noncompetitive and unfriendly way that it can. The PON splitters tend to be in containers up on the polls. It is a network based on a branch and tree architecture. Multiple houses are on one port and strand. A strand goes to a neighborhood where it is parceled out to the houses. A strand is only served by a single terminal. The neighborhood is therefore served only by one terminal - something that limits the ability to have choice. Broadcast TV is done using RF over glass in a way similar to delivery over hybrid fiber coax.

The FiOS architecture of course has no way to provide dark fiber to a competitor. With lit fiber a competitor could be hypothetically be given bitstream access. There are also other ways of doing fiber to the home where the fiber could be dropped in to a competitor's terminal and terminated in such a way that a competitor could make its own lambdas available. Now with FiOS, the installer cuts and copper cable and removes it from the house. Consequently, once you do that you will never again have pots-based phone service. You can not go back. Like the famous roach motel once you check in, you don't check out. The only way for a CLEC to get access to that home in the future – it could but it's called a network modification - would be for the homeowner to have copper restrung, a very expensive proposition.

Other architectures are more pro-competitive. You could have a strand to each home. Or you could have wavelength division PON. Or a lumped PON where you do have a PON but each house has a strand that goes to a neighborhood cabinet. All the PON splinters are lumped in that Cabinet. You can have different service providers in that cabinet each one with its own PON and, once you get there, you could make your own deal with whatever serv-

Easy short-term moves the FCC could make

- Restore Computer II/III regulated common carriage for DSL and other ILEC "broadband"
  - **This would instantly fix "network neutrality" without regulating the Internet,** by giving all ISPs at least one source of supply, restoring open entry to new ISPs
  - Cable was never common carriage (per *Brand X)* but could be encouraged to make voluntary deals to support unaffiliated ISPs
- If a Triennial Review of unbundling was so urgent in 2003, why have six years gone by without another? Competition *was* impaired!
- End "forbearance" of basic unbundling obligations
  - Loops should *always* be available to CLECs
- Interoffice transport "middle mile" (Special Access) rate reform
- But a future FCC could roll these back again… so what would be safer *and* bring the regulatory certainty needed for investment?

ionary

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ice provider in that cabinet you wanted to. Essentially FiOS was the most closed way possible to do fiber to the home.

Part 2 - - Is Restoration of Competition Possible?

Now it is time to ask is it possible to go back and restore competition?

In 2000 the regulatory framework was still pro-competition. You still had the protection of Computer II and III for ISPs in getting services from the incumbent local exchange carrier. Network elements were unbundled. Switching, fiber, and copper transport in the middle mile were all obtainable. If that is you were a CLEC. But there were a fair number of CLECs left and the CLECs could also access the remote terminals and the sub loops. So they could put their own DSLAMs in the field or even locate them in the cabinet's – which they are still allowed to do. However they are not allowed to get unbundled access between the central office and the cabinet which makes their task rather hard.

The incumbents looked at the language of the telecom act and found something called the necessary and impair clause. This is some of the ambiguous wording that the Telecom Act was notorious for. They took that language and went to a court and got the court to require the FCC to examine what was necessary for competition and the absence of which would not impair competition. This was the excuse for the Triennial Review in 2003. You see in 2000 the FCC reviewed the legitimacy of unbundled network elements and said "yep, perfectly legitimate -- they need to stay unbundled."

But in 2003 suddenly the FCC said, oops, we have to study what is necessary for this competition thing. They came to use the term "unimpaired" to mean no longer available for unbundling because competition was unimpaired by its unavailability. That's why in CLEC rulings you often have the word "unimpaired" show up in the text and when it does it means unavailable to CLECs. It is very Orwellian. The ILECs still have a natural monopoly to most subscribers because they were the de-jure monopoly that built the plant and so the other fiber to the home is unregulated and manages to lock out the CLECs and ISPs in a process of leveraging their advantage as a natural monopoly with this impairment analysis being used as an excuse to exclude the CLECs..

So let's look at what the new Genochowski FCC could actually do should it decide that it actually wants to restore competition.

To begin with without rewriting any laws the new FCC could could restore Computer II and III. It could also restore common carriage for DSL and other ILEC "broadband." The FCC has also deregulated all ILEC high-bandwidth services -- that is everything faster than DS3. ILEC SONET was deregulated. There is no more tariff for OC 48 for example. It was always of course too expensive to be useful. But that was because they have not been regulating those at reasonable prices anyway.

Now if they restored common carriage for DSL, they would instantly fix Net Neutrality without having to regulate the Internet.

COOK Report: How would they do this?

Goldstein: It would be through a rule making. They would have to have some ruling on the table of which there are many.

COOK Report: They would have to give some public notice of the rule making and have some number of weeks

or months set aside for people to hammer at them?

Goldstein: That's correct. The Administrative Procedures Act would apply. They could follow the APA, do a rule making and restore common carriage.

COOK Report: They would surely be able to get enough testimony as to the harms that had been done to make a very reasonable case for undoing?

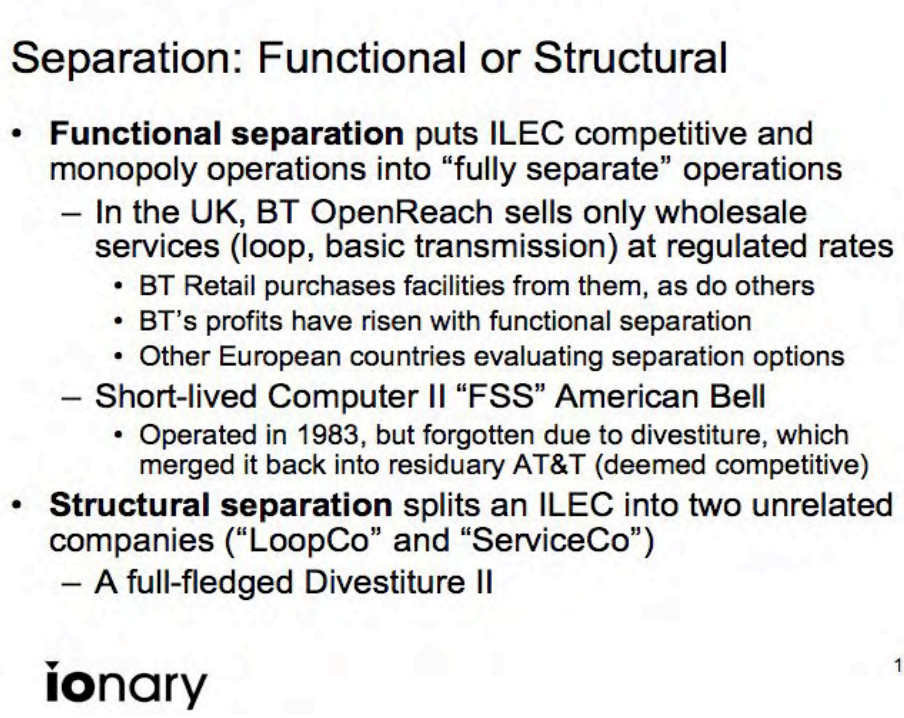
Goldstein: That's right. The mere fact that they've spent all this time and effort talking about Network Neutrality is *prima facie* proof that things are screwed up. If you have all ISPs including startups and at least one source of supply, and open entry to ISPs, then neutrality is not a question because you really do have 50 different ISPs to choose from -- as in the dial-up days. If you have a lot of ISPs and all of them were to say you are not allowed to use this application, clearly there is a market reason for that. But if two ISPs out of 50 say you can use an application, there is reason for suspicion. Now maybe 49 state you can't, but one says you can but it will cost you $100 a month. It is a market. It is telling you something.

These are clues. These are how cars work for example. I can buy a Ford product or GM or Chrysler or a Kia. Kia is taking away market share and as far as the other cars go we don't have much competition anymore from a Chevy versus a Ford -- what's the difference? Cable was never a common carrier. Brand X made that clear. The cable companies could be encouraged to pursue a voluntary new deals. There should be some influence over cable. It would be good for cable to let the ISPs on their plant. But the technology is different. Cable technology is not DSL. So you cannot easily apply DSL rules to cable. Still you could encourage the cable companies to offer a wholesale product in exchange for which they might be given a little more leeway in something else.

Now as to what else can be done, think about this. In 2003 the Triennial Review was really really urgent according to all parties involved. it had been three whole years since the last one. But what's going on now? The last Triennial Review was six years ago when the law calls for a review every three years. Furthermore it's widely agreed that the last Triennial impaired competition. Therefore, if you're serious about competition, we are well overdue for another Triennial review.

COOK Report: So the new FCC is really in a position where it has to do some of these things to show that it is different?

Goldstein: Yes. Sitting around trying to legislate the behavior of ISPs and enu-



merate what Internet services must be carried by them at what speed is not the way to do it. But that is what they've been focusing on because of the distraction of the Net Neutrality brouhaha.

Look at the issue of forbearance. Loops should be available. Because the FCC has actually said that even though the rules and the law are explicit. The requirement that loops be unbundled we should forbear from that requirement because we believe that there is adequate competition but you cannot get an unbundled loop or example in Omaha and in many other places. the whole idea of forbearance from the rules of wholesale obligation is ridiculous.

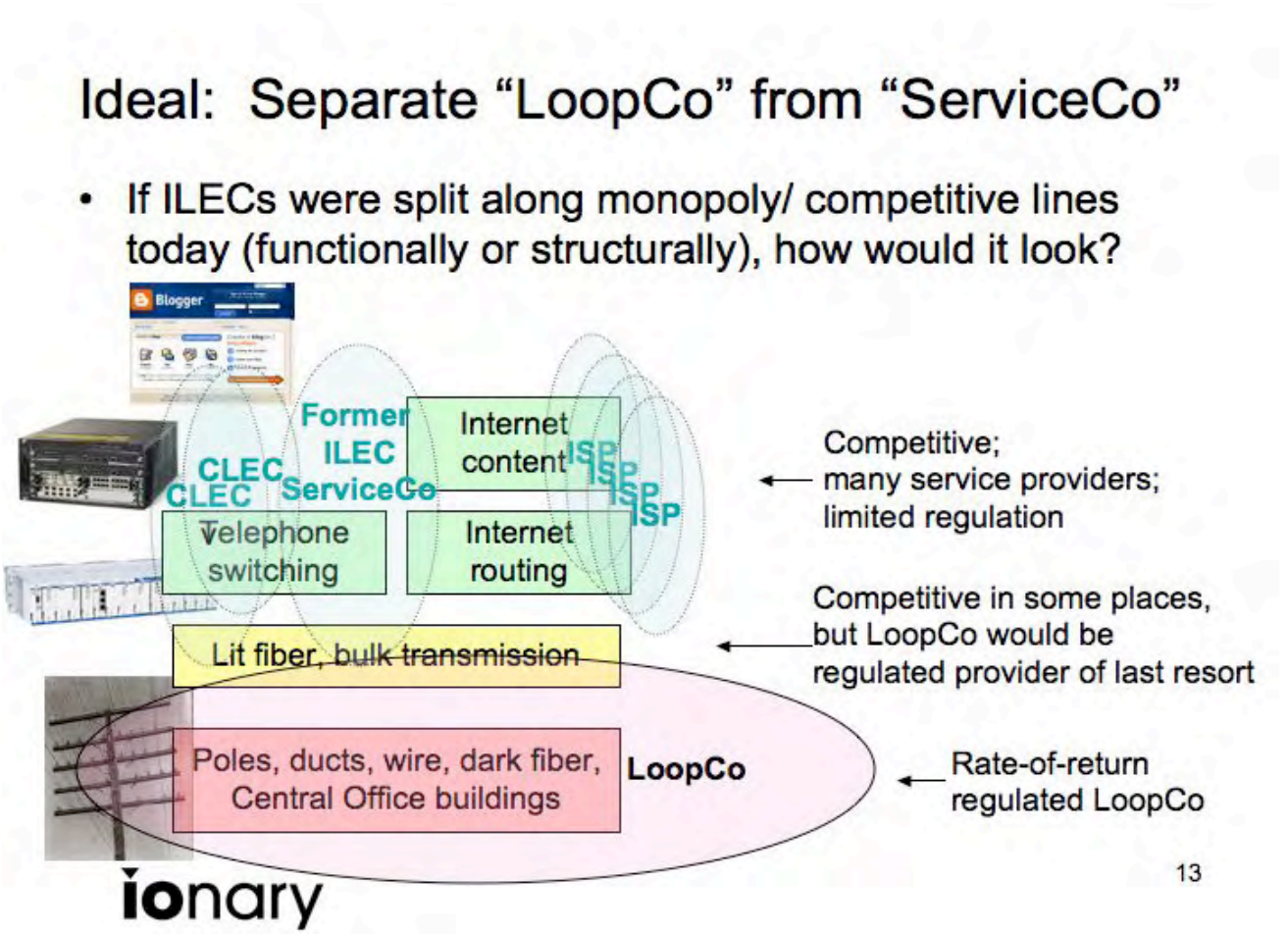
COOK Report: Because it relies on the fiction that there is competition?

Goldstein: That's right. But what exists is not competition but a duopoly. There are places where cable had more of residential voice than the ILEC.

COOK Report: And they are relying on the existence of a duopoly as proving the existence of competition that is sufficient for forbearance from enforcing their own rules?

Goldstein: That's right. All they've said in effect is that the ILEC has lost enough market share to the cable company and therefore they do not deserve to lose anymore.

Now the other thing that should be done on a short-term basis is to look at issues regarding the middle mile. And right now it is only available under the special access tariff in some locations and those prices are courageously expensive. The question of those rates has been on an open docket for years and they stood simply refused to make a ruling on the docket. It's time for them to rule and



establish "just and reasonable rates" for special access.

The only problem with FCC moves of this nature is that in the short term the FCC can act but in the longer term you inevitably get a different FCC with different political positions. Such a change in FCC could result in a change in the rates and in the change of the tilt of the competitive field to the extent there is any competition.

Why Investors Might Prefer Separation to FCC Action

Consequently, from the point of view of investment, since a new FCC could roll things back, investors might rather have long-term protection. Or in the way that they are prone to express it, "regulatory uncertainty discourages investment." This leads us to what would be a long-term answer and that is where separation comes in.

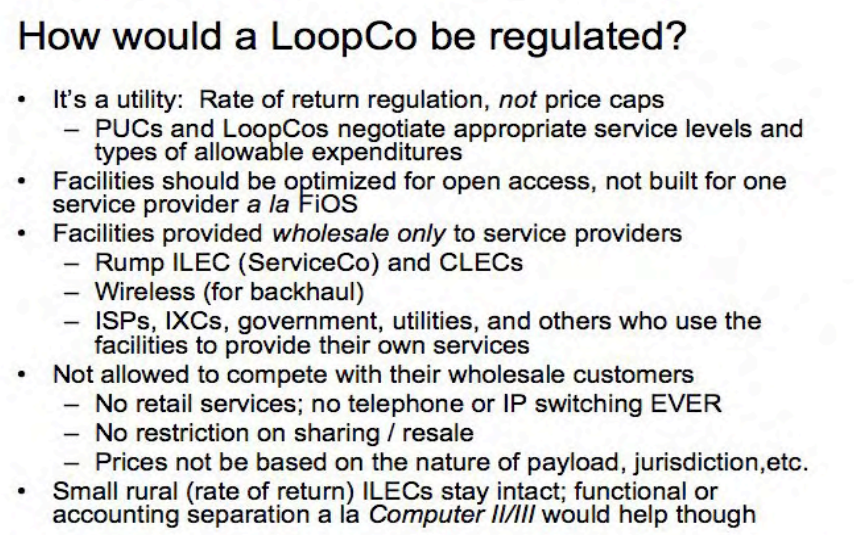
There are two kinds of meaningful separation that we can talk about. Functional and structural. **The first is functional separation which says that the ILEC has both competitive and monopoly operations and then that these operations must be "fully separate."** However, at the stockholder level it is still one company.

The UK has this with BT's OpenReach that sells wholesale services, loops, and basic transmission equivalent of special access and all of these are regulated rates. OffCom must approve the rates that OpenReach charges. BT retail purchases from OpenReach and so does its competitors. Now this apparently has been good for BT's profits. The prophets have gone up and down and there's some question as to what is caused by the separation and what is caused by the conditions of the economy but I do not believe that BT's separation has hurt its profits. Other European countries as well as some in Oceania are evaluating separation. The idea is spreading widely across the developed world.

If you go all the way back to Computer II, you will find a fully separated subsidiary called American Bell. This was before divestiture and AT&T had to set up a company called American Bell as its fully separated subsidiary. It became a part of AT&T the residuary, the competitive company, because they got the competitive things in the future. Consequently American Bell became a footnote in history. The Baby Bells created their own fully separate subsidiaries which didn't last all that long because they were given computer three and had no need of them anymore. While in the Baby Bells were starting from scratch, American Bell inherited the installed base of PBXs.

Structural Separation or Divestiture 2.0

Now a structural separation is the other option. And if you choose this, you wind up with two fully separate corpora-



tions. Call one a LoopCo and the other a ServiceCo or a facilities entity and a services entity. This would be Divestiture 2.0, in other words, full fledged divestiture. Now going back to our diagram what would a fully divested LoopCo and ServiceCo look like?

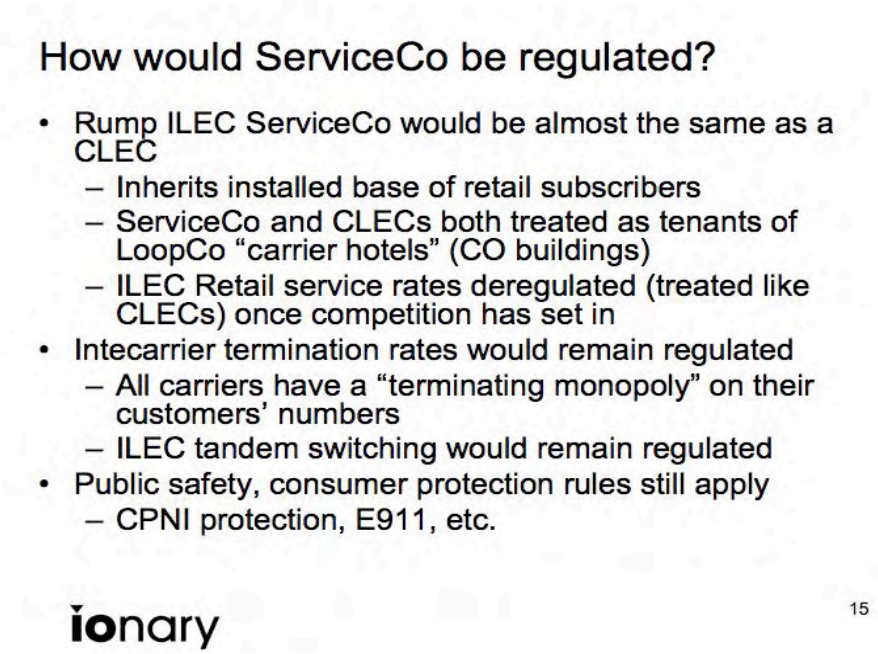
If the ILECs were divided between Monopoly and competitive lines, the LoopCo would own the pink stuff at the bottom. It would own the polls, the ducts, the wires, and the central office buildings. They would be under rate-of-return utility-based regulation. The lit fiber and bulk transmission would be competitive in some cases but the LoopCo would be a provider of last resort when lit fiber and broadband transmission could not be obtained in any other way.

The top layer of the content layer would be entirely competitive. Telephone, the former ILEC ServiceCo, and the CLEC would be essentially the same kind of company. Multiple ISPs would all have access. Many providers and little regulation. We have no need to talk about the neutrality of an ISP in this case because they are a publisher. They are not a postal carrier. We want for there to be many. The ILEC ServiceCo which inherits the services is the retail provider and sits on top of the wholesale service co. They are separate operations. [**Editor**: You should have many ServiceCos. Not just the ILEC ServiceCo.]

LoopCo would be under rate of return regulation not the price caps that dominate currently at the federal and most state levels. The PUCS and the ServiceCos would negotiate appropriate service levels and define what would be allowable expenditures for such services. As Erik Cecil will tell you there's always trouble to be had with a rate of return system but I would maintain that the it is just as Churchill said about democracy being the least worst system of all the possibilities. So the PUC would say no you can not pull fiber to the ranch for $30,000 and put that line in to your rate base for other rural fiber projects because that is too much money to charge but you can provide fiber to the suburb at $3000.

COOK Report: Will all of this be done in public in such a way as to avoid charges of abuse?

Goldstein: Absolutely. It would be done in public -- the rate cases, the hearings, everything would be in open and public testimony. Under rate of return regulation when rate cases are considered they always began with the Public Service Commissioner and the public utility commission determining what the appropriate percentage rate of return would be. Based upon the risk reward profile. There is a debt rate of return based upon that the actual cost of the debt and there is also an equity rate of return based on the risk involved. This is a low risk industry. They are being paid to put in place and maintain the uncompetitive wire so the cost of equity should be rela-



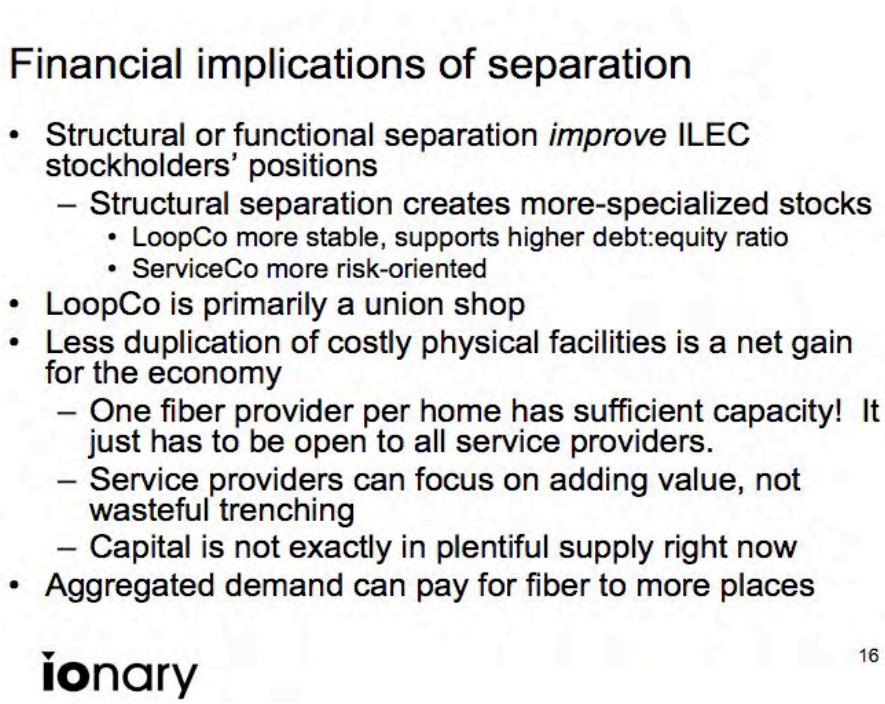
tively low and the rate of return relatively low as well.

The physical facilities on which the ServiceCo rides would in this case be optimized for open access. That would be part of the basic rule making. This is a policy judgment. The ServiceCo would never be allowed to build a single service architecture like FiOS.

COOK Report: In other words the open access aspect of the ServiceCo will determine the basic architectural technology used for the LoopCo?

The On Going Relationship of ServiceCos and LoopCos

Goldstein: That's correct. You may do for example a lumped PON. In such a case the loop-co is a facilities-based wholesale provider only. This is not a retail company. They sell services to the rump ILEC which becomes the ServiceCo. They sell service to CLECS. They back haul to wireless companies who become ISPs. They sell services to inter-exchange carriers to ISPs to utilities to the government pretty much to anyone who is willing to buy. And they build in their own networks on top of the basic infrastructure and provide services.



But they are not allowed to compete with their wholesale customers. No retail services. No telephone or IP switching ever. I don't mean the IP protocol. I mean information provider services. They are not ISPs. They are not a telephone company. They are wire companies. There is no restriction on the resale of their basic wire services. The prices must not be based on the kind of content transported. For example, the current rules having different prices according to the percentage of interstate use must be abolished. Questions about payload -- is this pig iron or scrap iron that we are carrying? -- must not be allowed. No longer will telephone tariffs be permitted to be based on 1880s railroad tariffs. The expense charged must be based on the cost of the facilities to determine a rate-of-return that is in no way related to the payload.

The small mom-and-pop ILECs would not be subject to this rate of return. ILECs for example in the Ontario and Trumansburg telephone companies of upstate New York with 10,000 lines apiece. Nevertheless they still should have accounting separation to keep their monopoly versus competitive services from cross subsidizing each other. They would still have a wholesale obligation. We are talking about the midsize to large sized so-called price cap carriers.

This ServiceCo would be regulated differently. It would be almost the same as a CLEC. It would inherit the retail subscribers. They would remain as tenants of the cen-

tral office buildings which become carrier hotels. The retail service rate of the Ilecs would be deregulated once competition had set in. In some states they already are, but this would be reason to deregulate them **after** there had been time for competition to set in in the aftermath of structural Divestiture.

However, because of the terminating carrier monopoly, inter-carrier call termination rates would need to remain regulated. I have to give you the call and I have to pay you to accept the call. What I cannot do is charge you four cents a minute to do that when everyone else charges three.

COOK Report: In other words there has to be, in some cases at least, an outside regulatory authority?

Goldstein: Because an existing service-co cannot be allowed to discriminate against another existing ServiceCo, assuming that is, we want a stable universally available telecommunications system. Therefore inter-carrier compensation dockets would not go away. Likewise for tandem switching which is essentially a monopoly service -- and therefore a special case at the wholesale level. It is one that the ILEC ServiceCo would still retain on a regulated basis. The rules about 911 dialing and CPNI, the network's customer private information. would survive. In other words, they would still be required to maintain their customer's privacy.

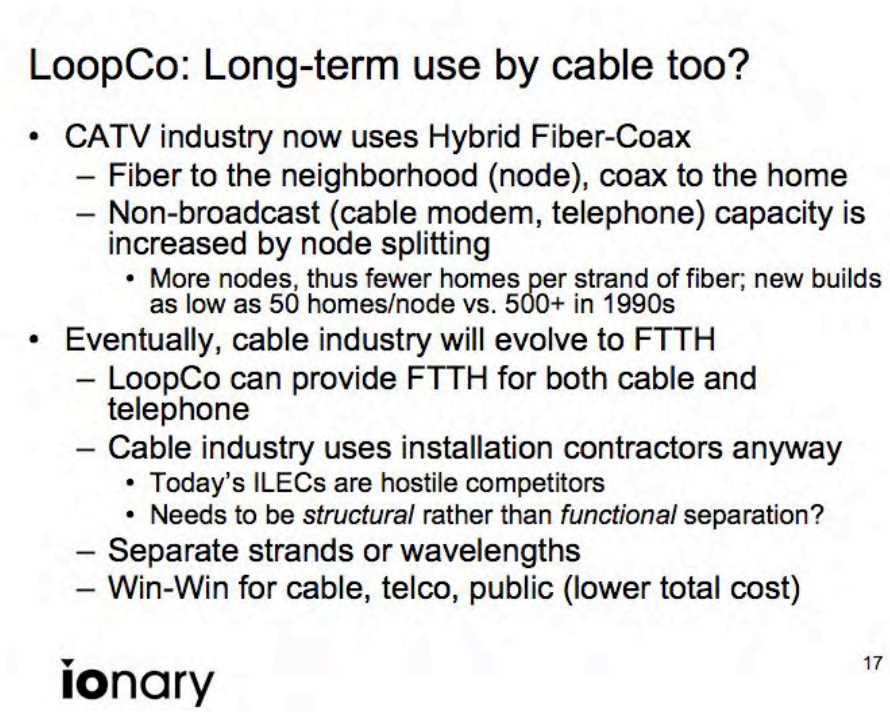
Financial Implications

Now let's look at the financial implications of Divestiture. You see that these actions could actually improve the stockholder's position within the ILEC companies.

Both structural and functional separation are good for stockholders. With structural separation you get more specialized stocks. The LoopCo is a stable company. It is a boring utility that can have a higher debt to equity ratio. It could absorb some of the debt that companies like Qwest are drowning in. The ServiceCo is more risk oriented and therefore that could be the company doing the newfangled stuff and the ISP kinds of innovative services. You can make the argument higher risk should yield higher reward.

COOK Report: And the total equity required to run a ServiceCo is much less than is needed for a LoopCo right?

Goldstein: The main equity for the ILECs at the service co level is the goodwill of its customer base. At the service-co level, the ILECs may not own the facilities but they do have the customers and the value of those customers, at the enterprise level especially, is quite high.



COOK Report: Correct. But to start a new ServiceCo if you have a level playing field and ease of entry is not nearly as expensive as it would be to think about establishing LoopCo. Which is the whole reason for separation to begin with.

Goldstein: That's right. A ServiceCo, depending on the size, can be started with a very small investment. Depending on the circumstances you could have a CLEC that in a few cases could be virtually a single person operation. I know some very small ISPs and CLECs out there and they can do a very good job for their own very small niche markets because they do not need vast capital. The critical point in every case is can they get access to the wire?

Under this scenario there is less duplication of physical facilities. The economy is much better off because you don't have five different sets of people digging up the streets trying to lay competitive networks. One fiber per home has sufficient capacity for everyone to do anything as long as it's open. Service providers can focus on adding value and not on wasteful trenching of putting more fibers in the ground. Gone is the need to make ready and replacing phone poles with taller ones and all the associated problems of manipulation of markets and pricing pointed out in your previous issue on Verizon.

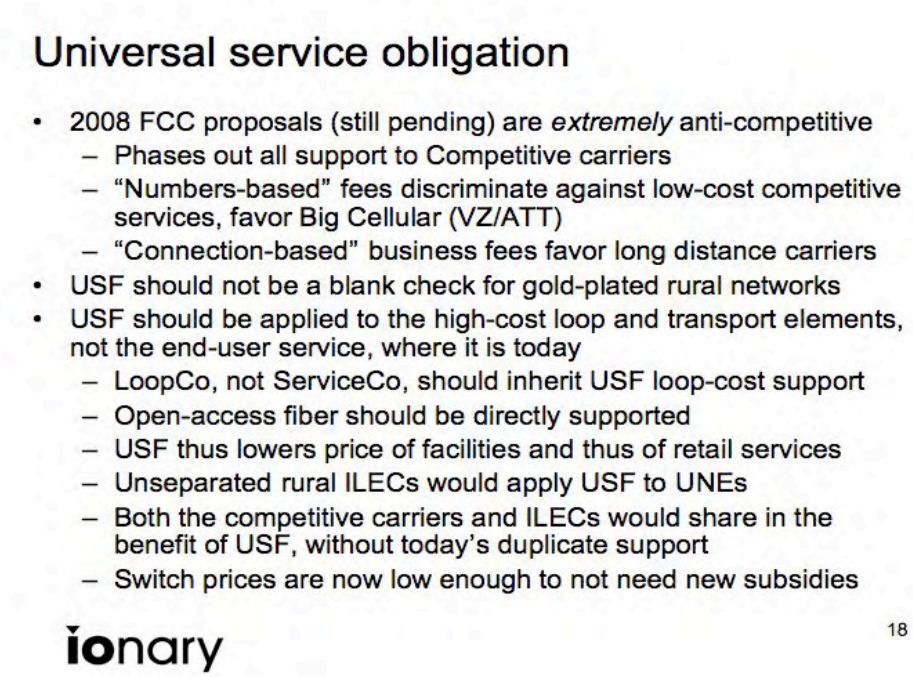
The issue is one of being a vertically integrated facilities-based provider that owns its own wire and co-exists along side other vertically integrated facilities based providers. These competing facilities based providers require capital that is not so widely available now as it was more than a year ago. Capital is in short supply and therefore **the greater aggregated demand that a single loopco can get – one physical plant provider for a whole universe of service companies -- can pay for bringing fiber to more places. If I have 100% market share on fiber because I am the LoopCo, I can go to places that a cable company or CLEC or an ILEC with only a partial market share could not.**

By the way the Australian plan is essentially a LoopCo and in this case a new national fiber-based LoopCo built independently of the recalcitrant incumbent. They are saying they will build a new fiber plant which will put the old one out of business. It seems like an expensive way to do it but I think they can succeed by aggregating all demand for the new technology that can be supported on a divested fiber infrastructure that the old incumbent is not able to provide.

What Happens to the MSOs?

Now let's look at the LoopCo in relation to cable companies. Multiple system operators use hybrid fiber coax.

They pull fiber to the neighborhood node and coax to the home. They increase the



non-broadcast capacity by node splitting. In the 90s, when HFC first went in, there were like 500+ houses per node. Nowadays with new construction is more common to have 50 homes per node. You are getting the fiber closer and closer to the home and it is clear that cable companies will eventually evolve to bringing fiber all the way to the home.

COOK Report: Sooner or later they would either have to do this or find themselves becoming a ServiceCo over the facilities of LoopCo?

Goldstein: That's right. They don't want to have to try to keep preserving the old coax forever or to pull new coax. It really is no longer economic. And the LoopCo could provide fiber to the home for a cable service provider as well as for any other kind of service provider.

In most cases cable companies don't pull their own cable. They use contractors. Companies like Di-com have Cable trucks all over the country and cable companies call them up and tell them where to pull. For this physical network construction they will never use the ILEC but if there were a structurally separated LoopCo, the cable company could call them. It would be cheaper.

The cable company could get their dark strand of fiber or at least as many lambdas as they want out of a LoopCo. So the LoopCo could serve cable as well and provide the cable industry with the kind of bandwidth upgrades that they need at much less expense than the development of Docsis 3.0 and successors to that.

When you are talking about a LoopCo pulling fiber to a home, you must remember that essentially you're talking about one small fiber cable for home but these cables can have easily five or six or even a dozen separate fibers. In Switzerland they are pulling multiple strands to homes. Strands are cheap it's the act of pulling them that is expensive.

This then is a win-win situation. Cable wins because they are upgraded to fiber to the home for less cost. The telco wins it is getting fiber to the home for less cost because it is a shared network. The public wins because it gets more and better services at lower cost**. The idea of having one company do this on the utility basis for everyone at a reasonable rate of return wins for almost everyone**. Now because it requires regulation of a monopoly it may scare some market fundamentalists and it may scare in the highlights who are control freaks. But from a public policy in a business point of view it makes a lot of sense.

Universal Service Clean Up

The Universal Service Obligation is the one last detail in need of fixing.

The FCC 2008 universal service proposals are clearly anti-competitive. They want to reform the Universal Service Fund which indeed is a mess. The current proposal phases out all support to competitive carriers and offers subsidies only to monopoly and incumbent service providers. They fund this by means of a tax on phone numbers which hurts low-cost competitors like VoIP.

[Editor: Magic Jack which, as Scott McCollough pointed out, is basically a terminating service charge arbitrage play would have its business model seriously impacted if the cost of a phone number for each new user was a significant percentage of the overall cost of the Magic Jack service.]

The cellular companies that get more revenue per number and the long-distance companies who don't even use numbers for their OC 48s win. And the other part of the proposal on the table for a connection-based fee is

that we will charge the same amount of money per connection whether it is a local loop or a cross-country wavelength. AT&T and Verizon business like that. But it hurts competitive local providers. In effect that's a very high bit tax which is very counterproductive.

The Universal Service Fund should not be a blank check with which to construct gold plated rural networks. It is now. Look at Sandwich Isles in Hawaii where they've gotten as much as $200,000 per house. The USF is paying off loans for that boondoggle that had over $1000 per home per month. Hawaiian telecom claims that they could serve those areas as well for a lot less. Many of these rural co-ops provide very good service at a very low cost to their customers because they've externalized their cost to the USF. They are on the rate of return where the rate of return is paid by the Universal services fund and not their subscribers.

USF should not be applied to the service where it is today. It should not be applied to bring down the cost of dial tone. It should be applied to the network elements. Loop and transport where they are expensive. You should have the loop co inheriting the loop cost support. The ServiceCo should get no support. The LoopCo should get it instead. Open access fiber should be directly supported not the services on the fiber itself. USF would lower the price of the facilities and therefore lower the price of the services provided by all service providers over those facilities.

The competitive carriers and the ILECs would share the benefits of USF. Right now if the local ILEC gets $100 a month support a competitive carrier - typically wireless - also gets $100 a month support regardless of their costs. That doesn't make sense because it just never works when you're subsidizing services. Part of the USF support goes to fund switches but there's no need for that anymore because switching now is cheap.

COOK Report: You present a very good case but what now? What happens next? Where does this argument go? To the policy making community?

Goldstein: Yes the policy making community needs to understand this. The incoming FCC needs to understand it. State regulators should be aware of this because it can also be done by state legislatures. I wrote a draft text of a state level separation bill. You can find it on my website. It is several pages long and answers a lot of questions about what a separation would look like. Including things like who could do what.

This could be done at the state or federal level. It could even be done at the Wall Street level where the investors go to the companies and say: look make us rich separate yourself. But I don't see that happening because of the culture of the predatory corporation. The CEOs stand up for each other. They don't stand up for their shareholders or their customers.

So it really has to circulate amongst the national policy-making community. To me this is far more important than talking about neutrality which is simply a distraction. This gives you neutrality but it also gives you a lot more.

One final benefit of this separation at an absolute level is that it provides a medium for new technology to be developed. Right now the telecom business model is completely broken because of its historic dial tone subsidy designed to deliver cheap home phones. IP and the Internet took off not so much because of its own technological superiority but because it could serve as a workaround by taking advantage of the status of an enhanced service provider that could get access to the wire and then do what it

wanted with that access. Under a new regime we could have all sorts of technologies developed if we have access to the wire technologies that would solve many of the problems we are currently in encountering under the vertically integrated monopolies.

First Mile Filing of June 8 (as we go to press)

Eric Lee: This is the link to FirstMile's filing in GN09-51:

http://fjallfoss.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6520220140

The suggestion of the moment seems to be that the internet be classed as a telecommunications service. Fred Goldstein disagreed. And Susan Estrada made the Following comment today June 10 - a comment to which Fred agreed.

Susan Estrada: The FirstMile.US comments were intended to be a start at framing a discussion that provides "an avenue to fix things, separate carriage from content, and let the market provide people with the Internet they want.* "

Why did we not name names? Because IMHO, names don't matter. Yeah, we've been screwed by your-favorite-co-name-here. Yeah, the US is behind virtually the entire freaking world. We all know that and have for many years. But it hasn't make any freaking difference. So why not start the discussion on a level that maybe even non-techies can embrace? We collectively need to break the Broadband Stockholm Syndrome that holds this country hostage.

We have an opportunity to start changing the language and creating the visual picture in people's minds of who's whoming who. In order to do that, we need to start at the beginning. Read the FCC NOI. Be afraid at the kinds of questions they asked in it. And then realize that the FirstMile.US response is an attempt to bring us all back to the beginning of an understanding of how to look at the big picture. Until the powers that be start looking at the big picture in a stratified way, I have no hope that we can begin to even tackle some of the harder problems. I do not want this to be just-another-exercise-in-futility.

Clean slate thinking is needed. Thinking about the pipe separate from the applications and devices is needed. And, unfortunately, Congress has mandated that the FCC think about the applications as well around federal policy goals.

So, we begin at the beginning.

Executive Summary

Broadband Mapping p. 1

I have delayed publication of the July issue in order to present two interviews. The first, with Sara Wedeman, was done on June 4. We both have labored mightily to include it before final policy decisions are made in Washington, DC. This interview was inspired by April's discussions relating to the efforts of Connected Communities, Inc., Broadbandcensus.com and Rachelle Chong. Having submitted a series of analyses to NTIA during the "public comments" phase of the development process, Sara has a lot to say about how mapping should be done, and why it is so important to do it well.

The interview focuses on three essential themes:

- How to, and how not to do broadband mapping;
- Methods for making the mapping process a substantive and meaningful part of the NTIA-BTOP program; and
- The connection between connectivity, civil liberties, and prosperity.

We begin by discussing research and mapping. These are astoundingly complex exercises, that should not be undertaken without the development of a sound methodology. Using population density as a case in point, Sara focuses on two examples.

In the first we examine an urban zip code, Philadelphia's 19104. In this case, using the wrong unit of geographic measurement (the zip code), distorts our understanding of just about everything. Zip codes were designed to facilitate mail delivery, not the measurement of complex, technical issues like 'lumpy' adoption and exclusivity of access. If we fail to consider population density (which we will do if we assess urban broadband access at the zip code level), we risk making sweeping and just plain wrong assumptions about who has access to broadband and who does not.

Next and by way of contrast, we cover a rural example, deconstructing West Virginia's first congressional district. This district includes 20 counties spanning the northern part of the state and abutting Ohio, Pennsylvania, and Maryland. Starting at the state level, the first district appears to be the most densely populated of the state's three congressional districts. However, 'smoothing' the data at this level obscures the fact that most of the district's seemingly denser population is located in just two census tracts in the city of Wheeling. Wheeling is located at the confluence of the Ohio River and several tributaries, which raised some interesting observations about the interconnected nature of topography, communication pathways, and trade routes.

The important point is that unless one knows how to do this type of research, there is a large danger that the above-referenced issues will be overlooked, resulting in a misleading portrayal of the true state of connectivity in areas both urban and rural.

But broadband mapping is not just about geography. More importantly, it is about people living in geographic space. We cannot conduct a credible mapping exercise without talking to people; asking them about their perceptions and experiences of high speed Internet access.

This methodological requirement demonstrates why a few short questions on these topics should be included in the upcoming Decennial Census.

If done well, broadband mapping will be a tremendously sound investment. Its contributions will not stop with locating unserved and under-served communities and creating a national map. It will also help in diagnosing, and presumably redressing, the many causes of service blockage -- which are likely to vary based on both social and geographic factors. Moreover, mapping has the potential to help infrastructure providers develop build-out strategies that literally reflect the 'lay of the land.'

The next thread of the conversation focuses on the relationship between connectivity, the Five Freedoms, and prosperity. The impetus behind our mapping exercise resonates strongly with the work of Amartya Sen, 1998 Nobel Laureate in Economics. Sen won the Nobel for exposing the explicit connection between the availability of accurate, timely information and the availability of food (or lack thereof) by analyzing conditions surrounding a series of famines in Bangladesh. His later work showed that the protection of civil liberties, the ability to participate in the timely, unfettered, exchange of information and opinion, as well as transparency on the part of society's institutions (along with two other freedoms) were critical to the health and wealth of nations. These, he called the "Five Freedoms."

On a macro scale, connectivity, trade, and prosperity are deeply and closely related to one another. Although Sen did not refer specifically to the Internet, it seems clear that the Internet offers an unprecedentedly speedy, open vehicle for exchange of the type that Sen describes – that is, as long as it is ubiquitously accessible and free from the control of society's most powerful institutions. Consider his words: "it lies in the obligation of States to guarantee or promote a climate of open and plural public debate, and to correct a situation in which these characteristics are absent or distorted."

This, of course, brings us back to broadband mapping, connectivity, and trade. Waterways - particularly points of confluence between several waterways - were the original highways, communication pathways, and nodes on networks of trade routes. River valleys, protected by topography and vegetation, were and are naturally-occurring shipping channels, outstanding conduits for the free and unfettered flow of information, and homes to markets where one could buy and sell goods and services. That is why so many major cities were formed on their banks.

To the extent that the nation chooses a high quality, granular, multi-modal approach to broadband mapping, this exercise will provide us with value that far exceeds its original cost. When combined and properly analyzed, data collected during the mapping process will help us identify patterns and points of leverage, both geographic and social. This knowledge will, in turn, be vital to crafting effective strategies for infrastructure installation and technology adoption -- goals that embody very spirit and intent of the Obama Administration's Stimulus Package.

Lessons for FCC p. 22

Fred Goldstein explains how the Bush led FCC gave the US some of the worst broadband infrastructure in the world by using Chicago School market fundamentalism to create a procrustean bed of so-called competition by which reality was made to fit into presumed assumptions. Fred finds that the Powell and then Martin FCC concluded that **that because competition**

is legally authorized, it must exist.

He points out that in telecom **what you must do is decide where the possibility of competition is realistic. Where it is not, you regulate. But if it doesn't really need regulation, don't regulate it.** To answer that question, you have to look very carefully at markets and market conditions at any point in time in order to define where regulation is needed.

We adds that when you think about regulation, you must recognize where the natural monopoly is. The network elements (or physical layers) are the natural monopolies. Services are what you do with your network elements.

You must look at each layer and its elements and decide how competitive they are. At the bottom of the natural monopoly layer are the poles, the ducts and the wire, the dark fiber, and the central office building. With later one you are talking about a natural monopoly. It means that you have no real possibility of entry here because the cost is too high. You have a duopoly rather than a monopoly because the cable companies entered at the same time with a different technology in making their basic layer one network build.

They christened this new regime as facilities-based competition and basically said if you want to compete with the newly entrenched facility as an Internet services provider you had to own the wire on which your services ran.

Fred finds that: Now if you happen to be AT&T or Verizon this was very nice because, of course, they were your classically integrated vertical monopolies.

Kevin Martin tried to ignore the telecom act and restructure of the industry around to the way it existed in the 1970.

Computer II made the internet possible until the Bush FCC overturned Computer II.

Computer II divided the phone companies into what we would now call functional separation. Under computer II, the telco provides under tariff so-called basic services. But the telco may also provide unregulated enhanced services.

COOK Report: Basic services would be dial tone?

Goldstein: Dial tone, but also leased line services. In short what many of us now call bitstream services. Basic services could go up the stack as high as X.25 and frame relay. It could not go as high as IP. And that is to say in concrete terms of the protocols available in that era. In order to operate in the enhanced services space, the telcos had to do so through a fully separate subsidiary. Such a subsidiary had to be treated the same as a competing corporation. It had to have separate people -- in other words its own employees. It had to treat the subsidiary the same as it would a competitor. The subsidiary would have to have separate facilities, separate buildings, separate sales force and separate technicians.

Fred finds that the FCC ran a The three front war against ISPs

Front number one was to attack the CLECs who provided most of the dial-up and this was back when dial-up still mattered.

The second front in the war against ISP's was to reduce the availability of unbundled network elements.

The third and final front in the war against ISPs was to take away the common carrier obligations of the ILECs.

He asks Is restoration of competition possible?

Without rewriting any laws the new FCC could could re-

store Computer II and III. It could also restore common carriage for DSL and other ILEC "broadband."

Now if they restored common carriage for DSL, they would instantly fix Net Neutrality without having to regulate the Internet.

The long term solution is structural separation into two fully separate corporations. Call one a LoopCo and the other a ServiceCo or a facilities entity and a services entity. This would be Divestiture 2.0, in other words, full fledged divestiture.

It would own the polls, the ducts, the wires, and the central office buildings. They would be under rate-of-return utility-based regulation. The lit fiber and bulk transmission would be competitive in some cases but the LoopCo would be a provider of last resort when lit fiber and broadband transmission could not be obtained in any other way.

The top layer of the content layer would be entirely competitive. Telephone, the former ILEC ServiceCo, and the CLEC would be essentially the same kind of company. Multiple ISPs would all have access. Many providers and little regulation. We have no need to talk about the neutrality of an ISP in this case because they are a publisher. They are not a postal carrier. We want for there to be many.

Financial Implications

Both structural and functional separation are good for stockholders. With structural separation you get more specialized stocks. The LoopCo is a stable company. It is a boring utility that can have a higher debt to equity ratio.

It could absorb some of the debt that companies like Qwest are drowning in. The ServiceCo is more risk oriented and therefore that could be the company doing the newfangled stuff and the ISP kinds of innovative services. You can make the argument higher risk should yield higher reward.

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A Note from the Editor on the July 2009 Format and Presentation

This issue leads off with a bonus June 4 interview with Sara Wedeman on how to do broadband mapping. This is important stuff and Sara gets it like no one else. It also has the promised April 22 interview with Fred Goldstein on the origins of the regulatory mess and divestiture 2.0 as a solution

Coming in the Aug 2009 issue - out by June 30. Eight weeks of Symposium discussion. April 16 to June 10.

Coming in the September issue out on or before Aug 1 an interview with Arcady Khotin on the 15 year history of Arcadia his 160 person strong software company based in St Petersburg Russia. (Hopefully some addition material from a May 20 interview with Yura Gugel CTO of RUNNET.)

Text, URLs and Executive Summary: I have attempted to identify especially noteworthy text by means of boldface for **REALLY** good "stuff" . **Also the proper Executive Summary in this issue continues**. I hope you find it useful. Feedback welcomed. You will also find live URL links and page links in this issue.. (I am also no longer changing British spellings of things like fibre to the American fiber.) Thanks to **Sara Wedeman -** see www.becgllc.com for assistance with the masthead logo. Captain Cook now charts direction by looking at a compass rosette.

I am omitting the contributors' page since a cumulative list may now be found at http://www.cookreport.com/index.php?option=com_content&view=article&id=121&Itemid=74