THE BROOKINGS INSTITUTION

WIRELESS BROADBAND AND ECONOMIC GROWTH

Washington, D.C.
Monday, October 17, 2011

PARTICIPANTS:

Introduction and Moderator:

DARRELL WEST
Vice President and Director, Governance Studies
The Brookings Institution

Panelists:

JOHN IRONS
Research and Policy Director
Economic Policy Institute

DEAN GARFIELD
President and CEO
Information Technology Industry Council

JOHN MAYO
Professor of Economics, Business and Public Policy
McDonough School of Business, Georgetown University

* * * * *

P R O C E E D I N G S

MR. WEST: I am Darrell West, director of Governance Studies and Director of the Center of Technology Innovation here at Brookings, and it is my pleasure to welcome you to our forum on wireless broadband and economic growth.

At a time of 9 percent national unemployment, it's obvious we need to determine ways to create jobs and encourage greater economic growth. There are many ideas floating around, but an area that has demonstrated a clearer track record is wireless broadband.

Mobile technology is surging in consumer demand. There's been a dramatic increase in the use of smart phones and other wireless devices. People love the convenience and the mobility enabled by wireless broadband, and there's no question that mobile technology creates jobs and builds long-term prosperity.

But we need to determine, what are the wireless broadband policies that will stimulate economic growth and provide other types of benefits? What are the investments needed to stimulate job growth and how can wireless play a role in this? How do we extend benefits of wireless technology to individuals and companies? How do we make sure that underserved areas -- either rural areas or underserved urban areas -- share in that type of prosperity?

To help us understand the potential for wireless broadband, we brought together a distinguished set of speakers. John Irons is Research and Policy Director of the Economic Policy Institute. John has a number of different areas of interest, including the U.S. economy and economic policy, with an emphasis on federal tax and budget policy.

Previously, he worked as the Director of Tax and Budget Policy at the Center for American Progress, and he also was an assistant professor of economics at

Amherst College. He also worked for the Brookings Institution in 1995 and at the Federal Reserve Bank of Governors so this is a homecoming, to a certain extent, for John.

His academic publications have appeared in a variety of different journals -- "The Journal of Monetary Economics," "Journal of Applied Econometrics" and "The Review of Financial Economics." He has a Ph.D. in economics from MIT.

John Mayo is a professor of economics, business and public policy at the McDonough School of Business at Georgetown University. His research interests lie in the areas of industrial organization and the application of microeconomics to public policy. He's published more than 50 articles in economics law and public policy journals, including "The RAND Journal of Economics," "The Journal of Law and Economics," "The Yale Journal on Regulation" and "The Review of Economics and Statistics," among other journals.

Previously, he served as Dean of the business school. He's been a Chief Economist for the U.S. Senate Small Business Committee, and he earned his Ph.D. in economics from Washington University in St. Louis.

The other individual who will be joining us momentarily is Dean Garfield. He's President and CEO of the Information Technology Industry Council. He came to ITI after serving as Executive Vice President and Chief Strategic Officer for the Motion Picture Association of America.

So our format for today will be as follows. I'm going to start with some questions for our panel, and then we will move to questions from audience.

So I'll start with John. One of the issues is in terms of what are the benefits of building a digital infrastructure -- what are the jobs that would be created by this and what benefits come once we have this type of infrastructure in place?

DR. IRONS: That's a good question. I think it's a very broad question.

I'll try to keep my remarks relatively brief.

But first, let me thank you and Brookings for having us here today. The last time I was here, I gave a presentation -- I'm going to try to recall the title of the paper. I believe it was "A Supergame-Theoretic Model of Endogenous Household Liquidity Constraints." I assure you this is a much more interesting topic today than a very theoretical paper I did a number of years ago.

So I'm first and foremost an economist, and I'm going to talk about the economics of this. I also have a longstanding interest in technology and the internet. My first website, I developed back in 1994 as a graduate student. I thought it was a good way to start writing for a general audience in a place where no one would ever see it. I was clearly wrong on that front.

But when I think about the economic impact of a broadband infrastructure, I think I think of the two things. One is: what are the benefits of building the infrastructure -- the job impact, economic impact? And then, what's the impact once it's built -- once you have millions of people who are using that infrastructure?

So let me break down my answer along those two lines. First, on the impact of building it -- I believe at the table out here, there's a paper that EPI published recently looking at the job impact of a prototypical investment in wireless infrastructure.

So we basically looked at the industries in which money would be spent and then tried to figure out what the job impact would be of those expenditures. We looked at a distribution of those monies that would be split -- about 50 percent would go to communications and manufacturing equipment. Some of it went to warehouse and storage, the telecommunication industry more generally and a couple of other categories.

If you plug all these numbers into a BLS employment requirement matrix, you get that approximately 12,000 jobs are created per billion dollars invested in wireless

infrastructure. About 3,500 of those are direct jobs. Another 4,500 are supplier jobs so people who are making the supplies that are then used in the construction. And about 4,000 of those are what we call indirect or induced re-spending jobs. So as the communications workers go out and spend their money at the movies or at the local diner, there are jobs that are created as the money gets re-spent through the economy -- and that's about 4,000 jobs. So in total, that's about 12,000 jobs per billion dollars spent.

So that gives you at least a rough sense of the magnitude, of the number of jobs that would be created by these kinds of investments. That's why you're building it.

So then the question becomes, what are the economic impacts once it's built? And we can talk about more of these in the Q&A, but let me mention a couple areas.

First, I think we have a better understanding of access to the internet generally. I don't think we have as good of an understanding of broadband per se, or even wireless broadband on top of that. So I think a lot of the benefits are seen as general benefits, to having access to the information network that's out there.

But in general, I do believe that speed matters. I'm old enough to remember a 28.8k modem was broadband as an upgrade from 14.4k modem.

MR. WEST: And I'm old enough to remember manual typewriters so --

DR. IRONS: Yeah. I'm going to say, I'm fortunate not to remember 9.6k modems or things even worse -- there were punch cards. That's before my time as well.

But location matters too, in terms of the wireless aspect. I think having access no matter where you are matters in terms of some of the issues I'm going to talk about, and I do think it's an important complement to wired networks as well.

So what are the potential benefits? I think the benefits to entertainment are fairly obvious -- streaming movies, et cetera, but there are also other benefits.

Education is obviously a huge benefit. If you have teachers who have access to better materials, if you have students who have access to better materials, that's of benefit for the education of kids in the country.

There are benefits to healthcare. There's a huge amount of discussion on healthcare costs in the country. And if you have remote monitoring, remote consultation, these can be huge cost-savers and have a benefit for the economy in the long run.

There's a lot of benefits that could arise from in the energy industry -- having smart grid technology can save energy, can save energy costs there.

So these are all very concrete ways you can have economic efficiency improvements or improvements in economic growth.

I think a less concrete but no less important area is the development of ideas, of knowledge and skills, and having access to more ideas, to better ideas is incredibly important for long-term improvement.

If you think about the basic growth accounting -- that economic output is determined by capital, labor and technology. I think access to broadband internet helps with at least two of those -- with technology. While you're building it, you're helping out with capital. I'm not so sure about the labor, although with all these dating sites, maybe it'll help the labor supply as well.

So I think when it comes to looking at the raw economic growth, there are some important feedback mechanisms there. So I'll leave it at that.

So let me just kind of summarize by saying that I think there's both the immediate job creation benefits of these investments as well as long-term economic growth benefits of having a better infrastructure in place.

MR. WEST: So just one quick followup. You were saying 12,000 jobs

for each billion spent. Billion spent on what? What are you including in that comment?

DR. IRONS: Well, I think one of the shortcomings of the data that are available is that it's not very precise as to exactly how far you drill down in industries. So we did our best guesstimate.

If you did wireless broadband, looking at things like towers, looking at the equipment necessary to build out the additional data loads and to come up with our best educated guess as to what that looks like. It's about 50 percent on the equipment side, but then there's a lot of other, more generic jobs as well -- like I said, kind of storage is one component.

So we try to take our best whack at this using the data that's available, which is not as precise as we'd like it to be. Construction, for example, is lumped into a fairly broad category. It'd be nice to have some additional analysis to get a better handle on the more precise nature of the kinds of investments that are made.

MR. WEST: Okay. John Mayo, you've spent a career studying telecommunications and have written extensively on this topic. When you look at that area in that industry, is this particular moment in time typical or do we live in an extraordinary time?

DR. MAYO: Well, we live in an extraordinary time. Today we are absolutely smack-dab in the middle, it seems to me, of a huge transformation in this industry, and it's perhaps an almost ideal time -- today or this period is an ideal time, I think, to -- if we've got the data -- to begin to address this transformation and the set of transformations that are going on, to better understand the causal drivers to the transformation, and where we might be headed and how we might smartly craft policy to better enable economic welfare.

Let me sort of put it in that sort of summary statement and just a little bit

of perspective, and I'll even go back to offer a bold statement but I believe that is true -- and that is that if you think about the entire history of the way human beings communicate with each other, there have really only been -- at least from an economist's perspective -- not a technologist's perspective but from an economist's perspective -- there have really been two game-changing events.

One is the advent of or the invention of the telephone. In 1876 -- March 10, 1876, we all learned in high school American History -- "Mr. Watson, come here. I want to see you." And that was a game-changing event.

Far less celebrated was a memo written in 1947 by D.H. Ring, who wrote a memo in which he laid out the concept of a cellular network. And in that memo, he envisioned -- he had a very bold vision -- that an adequately supplied mobile radio network, together with cars that were equally equipped, could provide service anywhere in this country.

Now those two events together put a parallel set of technologies in place for consumers in this country. One is a wire line network and the other is a wireless network. One that has offered for decades now a very high quality but nodal network that allows consumers to call from point A to point B -- or from point B back to point A. But it does not afford ubiquity.

The other network is a wireless network. The wireless network does afford mobility. It originally began with a lower quality set of transmissions, but that has changed a lot. The first wireless service began in 1973 by Ameritech, and it was introduced with a phone that was colloquially referred to as a brick phone because it resembled a brick. It weighed two pounds. It cost a dollar a minute for airtime and cost several hundred dollars to buy the phone itself.

As we all know, the size of those phones has shrunk dramatically. Now

you -- I'm sure -- all could raise up your phones -- I'm tempted to make you do it, but you're not my students -- to show me your phones, which fit very neatly in the palm of your hand. You make calls for $0.05 a minute or zero, if you're not at the end of your bucket now.

And the versatility -- and this gets to the broadband point -- the versatility of these phones has expanded dramatically. We have 300 million phones in place -- wireless subscribers in place today. They use and have demonstrated the value of wireless and wireless broadband in particular by using phones for up to, on average, 10 hours a month.

And if you look at -- and this is not a bandwidth hog but I think it does tell you something about the dynamism in this industry -- is the number of text messages send by a typical teenager in America right now is between -- and maybe you parents will know this -- between 3,000 and 4,000 texts a month.

Think about that. A typical teenage girl sends over 4,000 texts every month. That's -- to me, it's stunning. I don't know about for you, but it's stunning.

Now is this transformation going to go away? I think you only have to open up the paper. In my case, the latest time was on Friday, to see the introduction of the new Apple 4S phone, which had one million preorders.

And that's going to push smart phones to over 50 percent of the phones deployed. So there is an affinity, I think, that is palpable in wireless space.

What we can take away out of this transformation -- that I think otherwise starts to get very chaotic -- is number one, consumers have demonstrated by the tens of millions that they really value mobile. They value the ubiquity that comes from being mobile.

Number two, they value quality -- and by quality, it means less dropped

calls, coverage, transmission quality that comes from cell site deployment that has been happening and is continuing to happen and can happen if we complement private sector policies with policies that allow for more investment.

And finally, I think the -- and this speaks to your point, John -- is that when you think about economic growth and the challenges especially faced in rural America right now -- the challenges -- and I'm distilling an immense and rich literature in economic development down to two bullet points -- but the challenges of rural America in the economic sphere have traditionally been number one, they are geographically isolated, and number two, they tend to be economically specialized. There's a single manufacturing plant, a single mine -- and they're geographically isolated.

Broadband wireless has the direct ability to address both of those issues and confront those and ameliorate those problems directly. So I think there's still work to be done. We need to do a better job -- and I think, John, you alluded to this -- we'd like to know more about the microtransmission pathways that link and connect the dots so that we can better quantify that impact.

But there's really no question but that this is a growth area for the country.

MR. WEST: That's pretty mindboggling -- teenagers averaging 3,000 to 4,000 text messages. I mean, I think I average maybe three to four a month -- so I got to get with it, no question about it.

DR. MAYO: Do not try and figure out how many they send in an hour. I did it. It's a little scary -- while they pretend to be listening to you or doing their homework.

MR. WEST: Right, that is.

Dean, thank you for joining us. Just to quickly summarize John Irons --

one of the takeaways of his presentation was, based on his data analysis, he says 12,000 jobs get created for each billion dollars spent on building a wireless network, which is an interesting number.

And then John Mayo -- you heard much of his presentation. I gave you a very glowing introduction at the beginning of this.

MR. GARFIELD: Thanks for that.

MR. WEST: Now I'll just briefly introduce Dean Garfield as President and CEO of the Information Technology Industry Council -- someone who has had a long history of commenting on innovation.

The question I'd like to pose to you is kind of more from a policy standpoint. John Mayo and John Irons kind of talked about the job creation potential, the social and economic benefits. From your standpoint, working in the industry, what are the wireless broadband policies that you think are needed in order to stimulate job growth and economic development?

MR. GARFIELD: Thanks for that. Five minutes ago I had that feeling of when you travel and your alarm clock goes off and you're like, where am I and what time is it?

I had this down a little bit later in the day and so I apologize. I hope I'm not going to repeat anything that's been said already.

The benefits of 4G -- I think the previous guests have probably spoken about that quite eloquently. In short and from my perspective, 3G has been exceptional, and so 4G will be one of those few sequels that's better than the original.

If you just think about some of the data that you talked about, including the adoption of notebooks -- computers which have gone from 18 million to 70 or 80 million units in the last year -- or another data point around not just a number of text

messages but the number of applications that are being downloaded that have gone from 300 million to five billion in one year.

The necessity for getting more wireless technologies into the marketplace are clear -- or when you talk about 50 billion connected computers within the next 10 years, when all of your devices, whether it's your mobile app or your refrigerator is actually intelligent and, in fact, are speaking to each other.

So the call to action is clear. The question is: what is that action? The near-term solution is really in front of us and it's one -- I was walking earlier today and walked through McPherson Square, which is now a part of Occupy D.C. -- this is an issue that should unify those on Wall Street, as well as those who are part of the Occupy movement -- which is the super committee that's going to solve all of our problems has the ability to advance legislation that would make incentive auctions a reality.

And that is in 1993, really the start of this revolution that both of the previous speakers were talking about, was the auctioning of three times the amount of spectrum that had been auctioned previously through the PCS auction, and lifting the caps on per unit ownership of spectrums that take place in that same timeframe, which led to all of the benefits that we are seeing today.

The reality is that the FCC only has, I think, 50 megahertz of spectrum available for auction today. And so how do we create more spectrum, that invisible infrastructure, to do all the great things that we want to get done?

Incentive auctions where those broadcasters who have available spectrum that's not being optimized, who are interested in placing them up for auction would make them available, I think is a realistic, near-term solution for doing all of the great things that we'd been talking about.

MR. WEST: I'm just wondering -- Dean has mentioned the importance of

spectrum auctions. I don't know if either one of you want to address that -- or if you think there are other policy actions that would be important to stimulate greater job growth arising from wireless.

DR. MAYO: So I think there are -- I would echo Dean's comments, and perhaps just amplify on them in the sense that the notion of public policies that complement and enable the private sector to satisfy that burgeoning demand that I spoke of is really critical right now.

I think the notion of enabling spectrum auctions -- and in particular, the incentive auctions -- is a step in that process. It's one step, though. I might even go beyond what you're suggesting, Dean.

I don't think that we would disagree about this -- that as part of what ought to be a regularizing, if you will, of a steady source of supply, of moving spectrum from low value to high valued users -- things like a complementary secondary market that facilitates trades between parties where there's lower demand and higher demand, for instance, would be, I think, a very welcome thing.

And I applaud some of the members, at least, on the super committee who have already spoken to this issue of moving forward with the spectrum options.

MR. WEST: John Irons.

DR. IRONS: No, I think I agree. I mean, I think that we have to pay attention to where the bottlenecks are, and I think the spectrum is a bottleneck at this point. And so I'm looking at different mechanisms to make as much of the bandwidth available as possible -- makes absolute sense.

The challenge, of course, is that for markets to work efficiently, they need to be fairly deep, and so there's a challenge in making sure that these auctions are fair and making sure that the secondary market works. But I think those are elements of

market design that we know how to deal with in a lot of ways.

So I guess we have to look to see where the bottleneck is and try to facilitate as much more movement into that area as we can.

MR. WEST: What do we do about underserved areas -- whether we're talking about rural areas that are geographically remote or urban underserved areas? How do we, one, get better infrastructure built there so that they can share in the prosperity?

MR. GARFIELD: Don't all jump in at once. The one thing I would say about that is if you look at -- I guess two answers to that, both of which are taking place already or in motion.

One is reform the Universal Service Fund. Two is what we've been talking about, around making more spectrum available.

One thing that's very encouraging is that Pew has been doing a survey, I think, every year for the last five years on the adoption and usage of the technologies and tools that we've been talking about in underserved communities.

And what you see is that, in a lot of minority communities in particular, people are using their mobile technologies as a way of leapfrogging forward and bridging the digital divide.

And so the penetration rates for mobile technologies in minor communities are actually larger than non-minority communities, one, and then two, the use of those technologies to access the internet is also more significant.

So to the extent that we can make sure that there is broad broadband deployment in those communities, I think we help to get over some of those challenges and some of the digital divide issues that we've been confronting for a long time.

DR. IRONS: Yeah. I mean, I think I would agree with that. I think

there's -- the two aspects, I think, are distinct -- the rural versus non-rural. Yeah, and I think the digital divide -- the racial divide is incredibly important too, and there's a different set of issues with both, but they both include making sure that there's access and making sure that access is affordable. I think both of those things go hand-in-hand.

And you can have really great access but be priced out of the market. That doesn't help -- or you could have affordable access you just can't get. So you have to solve, I think, both of the issues simultaneously.

DR. MAYO: I guess for my part, I would not begin with public sector solutions, but I would do this more as a private sector/public sector partnership. Back to a statement I made earlier -- I think our very best policies will be those that complement and enable the private sector to deploy wireless in an efficient capacity -- because if we do that right through, for instance, smartly designing spectrum options, enabling it and allowing private sector firms to efficiently utilize the spectrum that is there, then we will still -- I think you are quite right, that there will still be in this country underserved -- and you called it underserved areas.

And it's really underserved people. There will be underserved people, and those people will exist in urban areas and in rural areas, and the solutions -- I just would emphasize -- the solutions to solving how we serve those people may very well be different, depending on the geography and the topography that exist.

As we all know, I think -- and I don't think any of us are engineers, but I've been told by enough engineers that in rural areas, the cost of deployment for broadband, for instance, is very distance-sensitive. As you start running out longer and longer loops, you're going to drive up costs a lot. Wireless, which is the topic for today, is far less distance-sensitive with respect to cost. So it may be that you have a particular technological solution for serving rural communities that may be somewhat different than

in urban areas.

MR. GARFIELD: One additional point to add to that -- to the public/private partnership point -- is that there are a number of initiatives that are moving forward now that are very encouraging. I know the Carnegie endowment, for example, has a whole initiative. I think their fund is almost $10 million that's really being dedicated to some of the cost issues around broadband deployment, particularly to underserved urban areas.

What they're looking at doing is using those resources and dollars as seed capital to incentivize private sector players to get in the game with them as well. I know a number of companies, including some of those I see represented in this room, are engaged and a part of that.

MR. WEST: Okay. Why don't we open the floor to questions and comments? We have a microphone that's coming up. Jim has a question up front. There's a microphone coming up here.

If you could give us your name, your organizational affiliation -- and we would ask if you could keep your questions brief, just we can get to as many people as possible.

SPEAKER: (Off mic) author of (inaudible) let's take his assumption that wireless broadband infrastructure will led to great economic growth and all the things that we hope that it will do.

My question has to do with the effectiveness of the means we've employed over the last few decades to get there. So the basic strategy has been the incumbents to move from low to high value has been very powerful politically, and the only way to get them to move from low to high value and to stop their gross pollution of the (inaudible) that are adjacent to them is to simply give them spectrum flexibility and

rights. That's the way. That's been the game we've been playing.

Now the question is how effective has that game been? So we've got LightSquared. There's Iridium and then SkyTerra. They got it for one purpose and then over the years, they gradually moved to mobile broadband. Sprint -- Goldman Sachs did a big play, then Clearwire came in and Sprint again -- lots of games, ten of billions of dollars of public assets given away to move to this future.

So now it's the year 2011 and it's going on too slowly. So now we're going to speed it up with incentive auctions and this Orwellian claim that the public is getting something, but clearly we're just speeding up this giveaway.

So I'm not asking an equity question. I cannot imagine that Google or Microsoft or the Information Industry Council would care because it's not coming out of their heart. It's coming out of the public's heart. They just want these services out there for this economic growth. They don't care if the public's giving away tens of millions of dollars of assets.

So I'm not asking an equity question. I'm simply asking: has this strategy really been so effective? It's really been going on since World War II, but it's accelerated despite all the talk about auctions since the early 1990s. The vast majority of spectrum is given away slowly, but a lot of people think it hasn't worked well.

But maybe this time is different. The spectrum auctions will speed it up. We did it with LightSquared in January of this year. They got all sorts of things. Maybe this time, we'll get it. The public doesn't seem to care one way or the other so it's easy to --

MR. WEST: Okay. How effective has this been?

MR. GARFIELD: I think -- I mean, I'll start and folks can disagree -- is it's been highly effective, for a lot of the reasons we've talked about. So you look at what

happened in this country in the '90s. I'm not suggesting that this PCS auction was solely responsible for it, but 1994 to 2000, what you got in the marketplace after those auctions were greater competition, significant reduction in price, a tripling of the investment in the space, private sector and venture capital, a tripling of job creation in that space.

To me, that sounds like a pretty good result. Whether it's the most optimized approach, I don't know. I'll leave that to people smarter than me, but I think it certainly worked and worked well.

SPEAKER: That's the exception to what I'm talking about, not what I was actually talking -- I'm talking about auctions (off mic).

MR. GARFIELD: Okay.

MR. WEST: John -- either John?

DR. MAYO: So not to replay everything here, but from an economist's perspective, the way we tend to measure things like economic success is price output innovation. And I echo what Dean suggested in that regard. I think the jury is not out. It's in, with respect to the auctioning process and the bringing of that extra supply online. Prices have dropped dramatically in wireless space. Output has exploded and innovation has exploded.

But I think your question really is trying to get at the issue of -- if I understand it -- of are there still inertias? Is there still some ossification in the transfer of spectrum rights? And my understanding is there are. There is, in mobile space and the PCS space, there is a secondary market and it works reasonably well. But there is other spectrum out there that is designated by its type that not be transferred, if I understand correctly, absent legislation from Congress.

And it's exactly that sort of inertia that blocks value enhancement, I think, in this particular case.

DR. IRONS: If I could add --

MR. WEST: Sure, go ahead.

DR. IRONS: -- just one more. I mean, I'm going to throw a little bit of cold water, right? I'm not going to speak to the particular length between wireless and -- or the spectrum and the issues, but the U.S. is not the leader in broadband deployment, right? I mean, the U.S. is falling behind other countries in broadband deployment in terms of speed and access.

So I don't want to say that -- you questioned, has this been a success? I think there have been huge progress along the dimensions I would just mention, but there's also a lot more that can be done. We need to have much better access, much faster speeds -- in general. I'm not just talking wireless, but broadband generally.

So I can't speak to whether or not the strategy has been a success or not. I can speak to the fact that I don't think, as a nation, we are where we ought to be.

MR. GARFIELD: I think we can all agree to that.

MR. WEST: Okay. Near the back, there's -- on the aisle, there's a guy with his hand up.

MR. COOPER: Mark Cooper, Consumer Federation. So we've heard about the auctions, but the interesting thing is that every one of the smart phones in this room is a wi-fi enabled device. And between 30 and 50 percent of the broadband traffic is actually terminated using the wi-fi connection, which is, in fact, an unlicensed place where there are no rights to use that spectrum.

In fact, you can argue that that is a more successful model than cellular. But at a minimum, it's at least as successful.

So in your auctions, how would you make sure that there's adequate unlicensed space for that kind of innovation, which certainly has been at least as

successful as this cellular license space?

MR. GARFIELD: From my perspective, I think the best way to do that is to not be overly prescriptive, which is to give the FCC the authorization to do just what you articulated, which we strongly support for all the reasons you've said -- on licenses, it's certainly served our country well and there's little reason for us not to continue to enable it.

MR. WEST: Other questions?

MR. GARFIELD: I know you were expecting a fight, but in essence we agree so there's no reason to fight.

MR. WEST: Okay. Yes, sir?

SPEAKER: My question is how much should we set aside?

MR. GARFIELD: I don't have an answer to that. I don't know if anyone else does.

DR. MAYO: Are you talking specifically about unlicensed --

MR. GARFIELD: How much bandwidth, yeah, and how much spectrum, yeah.

MR. BRENNER: This is Dan Brenner, Hogan Lovells. I want to change the topic a little bit, going back to the statistic that -- I guess a billion dollars of investment lease to 12,000 jobs. Last Friday, the Chairman of the FCC indicated that for every job lost, the internet creates 2.6 or 2.7 jobs. That figure's been quoted quite a bit, although it's not just U.S. jobs.

One of the challenges -- because I think everybody here feels the importance of broadband in a qualitative sense -- but how do we actually measure the value of broadband in terms of true job creation and in terms of true value to consumers for which the government should be, in a sense, responsible for making sure people can

get broadband?

So the figure you gave about thousands of text messages by teenagers -- I'm not sure that the U.S. taxpayer should be very concerned about that. If the --

MR. WEST: Parents.

MR. BRENNER: -- if parents want to do, if they want to send their kids for karate lessons or whatever they think is useful for the kid, that's their business. But it seems to me it has nothing to do with taxpayers spending money to promote broadband to un-served or underserved areas.

So what I'm trying to get at is what other economic information do we have that indicates that this national commitment to widespread broadband adoption -- that we're really on the right track -- or maybe that there's things that we should think about?

DR. IRONS: Yeah, well, let me take a crack at that, if that's okay.

So the 12,000 jobs, right -- that's jobs you get when you build this system, but it doesn't capture the value once it's build.

So I think the core of your question is, how much of the gains from the use of broadband goes to individual versus goes to society as a whole? It's kind of the classic distinction -- externalities in economics, right -- how much of broadband use is an externality versus how much is me just gaining value because I like listening to new music on Spotify kind of thing.

If it's all that kind of thing, then there's a less compelling case, if any compelling case, for government involvement because I pay for it, I derive usage. It's the same thing as me going out and buying a doughnut, right? So I get some value from it.

So the question becomes, what are the spillovers? And I think, from my perspective, there are significant spillovers. Education, I think, is one huge area. If my

colleagues are better educated because they read more economic papers on the internet, that helps me. That helps my job. So there are some spillovers there. If I'm working with better educated people, that makes me productive. That is a classic externality so there is some room there.

I think there are huge externalities from what I alluded to earlier, which is the idea generation aspect. These are things that help economic growth over the long run.

One way of viewing new ideas is that new ideas are usually combinations of old ideas. So the iPhone, right -- the one in my pocket, too. It's a phone. The idea of a phone was around for a long time. It's wireless. That idea's been around for a long time, and it's kind of a computer, right? That's been around for a long time.

So the combination of the computer aspect with the phone aspect turns into an iPhone. That kind of becomes a new idea.

And so if you think about the internet as a store of ideas -- I don't mean a store in a -- buy something -- but a storage area of ideas -- it exposes more people to more ideas, which then lets them combine the ideas in new and different ways, and that generates new economic activity that has spillovers.

When I put together a website, what's the first thing I do? I steal code from other websites, right? I look at, that's kind of cool -- how do they do their dropdown menu? I try to take that, combine it with other ideas. And that has positive spillovers, and that helps people who use my website.

If you look at the number of people who are doing open source software, right -- combining ideas, adding things together, making it available for free. I know government has benefitted enormously from open source software, right, so there are significant spillovers in that area as well.

So when you look at -- and that's just a couple of examples. There are lots of other examples out there where I think you see these kinds of spillovers. So I think that makes a compelling case for at least the potential for government involvement to expand access to make it affordable, to make it available to people who wouldn't otherwise have access to it.

So, in my mind, there are very compelling cases why this is not just a doughnut at the corner drugstore.

MR. WEST: Dean, go ahead.

MR. GARFIELD: No, no.

DR. MAYO: So I think at the heart of your question is a question many of us have right now -- and that is, how can we -- we see it all around us, but can we measure it?

And this is actually very akin to what has now become a very famous exchange in the 1970s when Bob Solow, who won the Nobel Prize in economics, was asked about the impact of personal computers on productivity in the economy. And he said, "We see it everywhere but in the data," and he was right at that moment.

And the challenge was for people that are tasked with measuring productivity and output growth is that it's really hard to measure the stuff. So I just would like to say that it's hard to measure and it's hard to quantify.

The sort of things that John has done, I think, are saying, "Let's take a very conservative approach. Let's be as cautious as we can to estimate those direct job growth benefits." And beyond that, we have to start to rely on logic, on economic logic -- and it's a compelling logic. It may not show up on our day to day productivity statistics in a line item over at BAE and said, "Oh, here's the asterisk that says productivity growth due to wireless broadband." I wish it were there. It's not yet.

But you can look at -- and let me take the case of rural America. I mentioned in rural America, there are two challenges -- economic specialization and geographic isolation. Think for just a moment about what broadband does for those two historic problems for economic growth in rural America.

In both those cases, you break down the economic isolation of -- and the specialization -- by enabling entrepreneurs. And to John's point, it takes that stock of knowledge, the stock of society's knowledge that historically has been embedded in urban America, and it creates an ability to access that stock of knowledge everywhere, including rural America, where it has been a serious impediment to economic growth.

And so it winds up being in that case that I think you can really point directly to broadband as, in a sense, a lubricant to economic activity, to follow on with John's point.

DR. IRONS: If I could -- I'm sorry.

MR. GARFIELD: I was just going to say, just using logic -- you look at cloud computing, for example, which it's hard to imagine existing without internet infrastructure and broadband -- is now a $35 billion business that didn't exist at all three years ago and is expected to be, within the next five years, a $70 billion business.

The connection between broadband and cloud computing may not be discernible using a clear line algorithm, but it logically makes sense. And would we have Darrell West without broadband?

MR. WEST: No.

MR. GARFIELD: I rest my case.

DR. IRONS: If I could just pick up a piece of this -- let me connect the rural piece with part of what I mentioned. There's large economic literature on a glomeration effect -- so kind of a Silicon Valleys of the world. Paul Krugman -- he didn't

win his Nobel Prize for just “New York Times” columns, but he won it for, in part, his economic trade theory, but in part his economic geography.

This kind of broadband fundamentally changes what we mean by geography in a lot of sense -- because if you don’t have to be physically located next to another factory, another business to kind of get those glomeration effects anymore.

And so I think when you think about those kinds of glomeration effects and communities, you can have a rural area be part of an agglomeration network with that kind of connectivity that they would not have been able to have without that e-connectivity.

DR. MAYO: Exactly.

MR. WEST: Okay, there’s a question over here.

There’s a microphone coming over to you.

MR. RANCH: Thank you. Russell Ranch with the Center for Government Interoperability.

Mr. West, you wrote back in 2009 that fragmented and decentralized offices make it difficult for bureaucrats to work together to promote new ideas, and Dr. Irons, you -- I’m sorry -- yes, you encouraged policymakers and businesspeople and scholars to get in a dialogue and debate regarding modern issues at the nexus of business and public policy.

How can we get more people involved in those two aspects of being involved in the debate? The average -- I mean, this room’s full of people that are interested and there’s 100 of us here, but how do we expand that? How do we get a multiplier effect on that?

MR. WEST: I mean, the two industries that, from my standpoint, have been slowest to engage with technology innovation have been education and healthcare.

That's changing in both of those areas. There are exciting new advances in terms of getting technology in education to personalize learning, and we did an event, we put out a paper at Brookings last week on that, and ditto for healthcare.

As you know, interruptability is a huge problem there, but there are different means that are being attempted to share data so we can do better analysis so that patients can get better care.

So I think we're seeing signs that the areas that have been lagging are starting to pick up and that encourages me as we look to the future that there will be more people interested and engaged in this, and starting to see some of the benefits.

DR. IRONS: We were just discussing whose website that came from -- I think this is John's website.

DR. MAYO: It may have been actually from a website at Georgetown -- the quote. Did you really mean to address it to Dr. Irons?

MR. RANCH: I'm sorry. I kind of got notes and I think I might've mixed up --

DR. MAYO: He would give a better answer than I would, but let me take a stab at it since it's from my website. So I think that's actually a very good question. The question is: how do you get people engaged?

Let me twist it just a little bit and suggest that I think we do have people engaged but we don't necessarily have people talking to each other. That's why events like this one, I think, are really quite important, and that is that they bring together academics and policymakers and people from industry.

And back to my words public/private partnership earlier, I think that the idea of looking for policies that allow for really understanding what the growth opportunities are from the private sector, what the needs to be picked up by the public

sector are and what is it that we specifically need to know from the academic community about those specific linkages and the benefits from particular areas?

So I actually like events like this a lot -- not just having the policymakers in a room by themselves via the industry and its own world, and academics sitting up on the Hill.

DR. IRONS: And I'd point to a colleague of mine, Carl Malamud -- has a project and I'd like to know what it's called. I don't know if anyone in the audience knows what it is. He's attempting to essentially archive everything the government's ever done so people can see it, right? He's trying to -- he had an effort to try to webcast every hearing of every committee on Capitol Hill, and try to make available as much data as possible, archived data.

He's currently getting a huge amount of archive video and just posting it on the internet. So his goal -- I think this is part of the effort -- is to put as much available online, have people mix it, remix it, see it and that'll at least begin some dialogue.

MR. WEST: Near the back, there's another question.

SPEAKER: Afternoon. My name is (off mike).

MR. WEST: Actually, can you speak up? We can barely hear you.

SPEAKER: I'm from Africa. I can shout without a microphone.

MR. WEST: Okay, that's fine. We can hear you now.

SPEAKER: Okay. My name is (inaudible) and I'm with African Development Center.

My question is, in light of the globalization of the digital world that we live in, what could the entrepreneur in this hemisphere do in a place like the continent of Africa, where this technology is still at its infancy? (Inaudible) in Africa -- and so some of this related kind of subjects, I'd just like to hear your comment. Thank you.

MR. WEST: Okay, what's the potential for this in Africa?

DR. MAYO: Well, let me -- I hope I'm addressing your question. I will say that the academic community is -- economists in the academic community -- are doing research on specifically the role of technology and wireless deployment on economic development in various countries, and I'm happy to meet with you and give you some specifics after this event.

Two people that come to mind are a woman named Professor Jenny Aker, who's at Tufts University, and a Professor at Georgetown named William Jack, both of whom have spent extensive time on the ground in different African countries, looking specifically at the impact of wireless deployments on the efficiency of particular supply chain flows.

MR. GARFIELD: The other thing that I think is -- which complements that in some respects -- is to the extent that you can get companies to view Africa broadly -- but certainly certain countries in Africa -- as a growth opportunity, then you'll see the type of investment that's necessary to have the benefits that we've all experienced in the United States.

In talking to a lot of our members, I hear more and more -- certainly more than I did two or three years ago -- companies looking at two places -- Latin America and Africa as significant growth opportunities, largely because of what I mentioned earlier, around mobile technologies being viewed as an opportunity to leapfrog ahead in some respects and drive growth.

MR. WEST: Other questions?

Yes, here in the front we have a question.

MR. SWAN: Thank you. Harry Swan from the Voice America. I actually got a two parts question.

John Irons mentioned about that we -- our broadband and wireless networks are actually lagging behind some other countries in the world. So I'm just wondering how far behind are we? Is this urgency that we need to desperately catching on?

And also, all these countries -- I'm guessing maybe some European countries, maybe Japan and South Korea -- if they are already ahead of us, they already harnessed the benefits that you just mentioned -- maybe job creations or other economic benefits. And do they already harness the benefits and is that one of the aspects that we can look forward to?

Thank you.

DR. IRONS: Well, that's a good question. I mean, I do think that we are behind -- and I don't have a million statistics, but I'm sure my colleagues might have several.

I think it's an interesting question about whether or not they have already harnessed the benefits. And I think this might be the case, in the case of the Solow quote, where you can see it everywhere but the data.

I think most of the benefits that I mentioned -- the growth and impacts -- our benefits take time to materialize, and so you're not going to see them in the year to year fluctuations.

I am unaware of any research -- you might know some research -- of specific reports linking broadband/employment across countries, whether or not that has a measureable impact on growth. Frankly, if I saw a study that said it had a huge impact, I probably wouldn't believe it because I don't think we've had enough long experience that would be necessary to really generate those benefits.

I'm very confident that they exist and that we will see those over time, but

I think it's a very hard thing to measure. That's my initial --

MR. GARFIELD: Yeah, Deloitte recently published a report on 4G and the benefits of 4G technologies, and looking at the U.S. versus other major markets, and in raw numbers, mobile technologies and adoption of mobile broadband, the U.S. is ahead of the world, but in adoption and penetration, we're falling behind other markets -- certainly behind Japan, South Korea and some of the other markets.

The other thing to know internationally is there are other markets that are using market mechanisms to deploy 4G more effectively than the U.S. is, and so Germany -- case example in Japan -- you mentioned Japan -- in the last two years, have both rolled out an additional 300 megahertz spectrum for mobile technologies. And so they've done what the United States proposes to do in its broadband plan over the next 10 years.

The second part to that is from the point you say go to where you say whoa and you see really sparse smarts (?) and fast speeds, it's typically a very long time. The experience we had in the United States is it takes anywhere from six to 11 years, and so we -- not only are we falling behind in giving the authorization in setting up the market systems that are necessary, we're falling behind because after you say and authorize that kind of activity, it'll take awhile for it to be fully deployed.

MR. WEST: Excuse me -- over here, in the front row.

MR. PERINE: Hi, Keith Perine. I'm a reporter with "Congressional Quarterly." In regards to the FCC revamping its Universal Service Fund to foster broadband deployment, is that the most effective thing the government could be doing to foster the deployment -- that is, redirecting money the customers pay on their monthly bills? Is that sort of the best use of that and an effective way to foster broadband deployment?

Are there other tools the government could be using -- besides freeing up spectrum -- to do that? Is there anything like that in other countries? We're behind a lot of countries in broadband deployment. Do other countries have anything analogous that -- universal service for broadband obligations?

And then as a related question, it was said that efforts on adoption should happen at the same time. Are we doing enough on the adoption front -- besides education, which there's some education efforts -- but could the government be doing more to close the divide in the broadband adoption than it is?

MR. WEST: Thoughts on Universal Service Fund and other policy actions?

DR. IRONS: So I think we have a history of universal service in this country that dates back at least to 1907, with Theodore Vail. The history, I think, from an economic perspective on looking in the rearview mirror now on universal services -- that it has been an extraordinarily costly endeavor.

We accomplished the task of getting telephone service, telephone facilities to everybody in this country, pretty much, but when you're spending $7 billion a year, the returns from that are just very difficult to identify at this point.

So if you yolk that observation -- that we were spending $7 billion a year together with the theme of today -- and across all the panelists, I think -- is that looking forward -- not looking in the rearview mirror but looking forward, we're looking at a wireless world, and a wireless broadband world.

And so I guess I would suggest that to the extent that we look forward, the principles -- I don't know about the particulars of the FCC plan that you want to talk about, but the principles would be that you'd like to focus it forward looking on broadband, not in the rearview mirror on narrow band, you'd like to make sure that it

enables a private sector build out for both deployment and adoption.

The private sector's likely one to just jump at. It's not as though private companies don't want customers. They do want customers. They just want them in the most cost efficient fashion possible.

And then when you're sitting over at the FCC, the goal of the FCC ought to be that to the extent that we want to accomplish broadband deployment in a universal service fashion and it is not going to fully, totally, be accomplished by the private sector, doing everything we can to accelerate that private sector deployment -- then we can start looking at the question of how do we do those subsidy flows smartly?

And there's a right way to do subsidies, and that is to fund them very broadly, with ideally the entire tax base. But it's not all users of telecommunication services. And to target it narrowly to people who would not otherwise adopt broadband. So there are standard public finance principles that suggest there's a right way to do this.

Now we'll see over time how the FCC does that, but I sure hope they adopt those principles.

MR. WEST: Right here, in the third row.

MR. MAISH: Hi, Charlie Maish, LMG.

My question primarily is for Dr. Irons, but if anyone else has thoughts that are related, I'd be happy to hear them. In your paper, I guess first of all, did you identify or make any assumptions about exactly how much total investment would be required to get up to whatever the baseline of service that we're talking about -- unless you mean 4G?

And then as far as the benefits go, in terms of certainly the job creation, but I think the other sort of extended benefits -- do they accrue differently when you're looking at rural areas?

In other words, did you need to invest -- so per billion dollars invested, because of the population, because of some of the other challenges, are there less sort of second tier economic benefits or social benefits that accrue in those areas -- or how does that kind of shape up?

DR. IRONS: Yeah, to answer your first question, no, we didn't really make it a judgment about how much would be necessary. We just looked at a prototypical -- if you throw a billion dollars at build out, what would that yield in terms of jobs? I mean, I know there have been some estimates out there about how much could be invested. We didn't take an independent stance on that. So we just -- if you think it's $10 billion, multiply your number by 10 and you get something close.

On your second question, I think that's interesting and I don't think we fully know the answer to that question. But the question is -- if I can paraphrase -- are the benefits, once it's built, going to be different for the rural versus non-rural?

And I think the answer's yes. And I don't know if there's any real, hard data to support what I'm saying but here's my general impression.

If the benefits that I kind of hinted at earlier -- those kinds of benefits are from bringing people who do not have access into the system -- that's where the big jump is. I think it's probably a smaller jump in getting from 3G to 4G but there's probably still some jump.

But access to rural areas, I think, would have a bigger impact than kind of bringing access to cities. For example, just because you are connecting people in a way that they weren't connected before -- so I think that has a bigger impact than in the cities.

The other piece, too, is a lot of the benefits -- I mean, you think about the health benefits. If you only have one hospital in your town and you don't have specialists,

getting that broadband access to people who can do specialized readings and x-rays has a huge value in a way that you don't -- that value isn't there if you are in a city and already have access to a number of specialists.

So I think when you look down the list -- on education, on energy, on healthcare, on just access to ideas -- I think all of those areas tend to point, to me, to there being a larger benefit to rural areas than to non-rural areas.

Like I said, I'm not sure there's any data to support that, but at least that's my initial impression.

MR. MAISH: And that makes sense. I just sort of -- there's a -- when you divide, your denominator is (off mic). That's kind of what I'm getting at.

DR. IRONS: No, that's right. That's right.

MR. WEST: Other questions?

Okay. If not, I would like to thank Dean Garfield, John Irons and John Mayo for sharing their views -- and thank you very much for coming out.

(Applause)

* * * * *

CERTIFICATE OF NOTARY PUBLIC

I, Carleton J. Anderson, III do hereby certify that the forgoing electronic file when originally transmitted was reduced to text at my direction; that said transcript is a true record of the proceedings therein referenced; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were taken; and, furthermore, that I am neither a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

/s/Carleton J. Anderson, III

Notary Public in and for the Commonwealth of Virginia

Commission No. 351998

Expires: November 30, 2012