UNITED STATES OF AMERICA

FEDERAL COMMUNICATIONS COMMISSION

NATIONAL BROADBAND PLAN WORKSHOP

INTERNATIONAL LESSONS

Washington, D.C.

Tuesday, August 18, 2009

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P R O C E E D I N G S

MR. DE SA: Good morning. My name's Paul de Sa. I'm with the Office of Strategic Planning here at the FCC on behalf of my co-moderator, John Giusti, from the International Bureau. On the whole Commission, I'd like to welcome you all to our panel this morning on international lessons for broadband. As you know, the commissioners are absolutely committed in writing the broadband report, to gathering the best facts and analyses and people from all around the world.

And the purpose of this morning's panel is to continue that process and really get underneath the lead tables and matrix that people often talk about in international comparisons, and really understand the drivers of broadband demand internationally.

We're really trying to understand the structural, the cultural, the industrial factors that drive broadband deployment and adoption throughout the world and understand what lessons we can learn in terms of what to do and what not to do in the United States.

We're very lucky this morning to have a great panel of people who've spent much of their lives, really, understanding on-the-ground the international situation. Let me just quickly go around the table. We have Professor Yochai Benkler from Harvard. Robert Atkinson. Tim Kelly from the World Bank. Raul Katz from Columbia. Jeffrey Eisenach. Deborah Lathen from Lathen Consulting. Noh Young Kyu from the Embassy of Korea. And Robert Pepper from Cisco.

So we're going to have a very lively discussion. Before we get into the panel, we're going to have a couple of framing presentations, and John will introduce those.

MR. GIUSTI: Great, and good morning, everyone. Thanks, Paul.

I would like to join Paul in extending a welcome to our speaker, to our panel members and, of course, the audience here, and also over the Internet. I am particularly excited about today's panel. I am, as acting chief of the International Bureau and having spent 13 of my years here at the Commission on International, I have a particularly

strong belief in the importance of learning from the successes and the failures of others and from sharing the FCC's experiences with our counterparts.

So I think today is an important part of that discussion, especially given that so much of the dialogue recently has been focused on best practices to foster broadband growth and usage.

So I'm eager to hear this, perspectives of our panelists on recent developments, and the relevance or not to the development of the U.S. National Broadband Plan.

I would like to introduce our first two speakers, who will present before we start our panel discussion. First is Irene Wu from my excellent team in the FCC's International Bureau.

She'll make a presentation on the data that we have collected to date as part of our examination of broadband issues. Some of the broadband data correlated to different demographics of just income and education have already been placed in the record of our Broadband

Act Improvement Act proceeding, so both Dr. Wu and myself certainly look forward to hearing from panelists as well as public feedback on our data collection.

And, second, we are privileged to have Yochai Benkler, a Berkman professor of entrepreneurial legal studies at Harvard, and the faculty co-director of the Berkman Center for Internet and Society, to join us today. As many of you know, in July the FCC announced that the Berkman Center is conducting an independent review of existing literature and studies about broadband deployment and usage throughout the world, so I'm certain that this project will be an invaluable resource for us at the Commission as we work on our National Broadband Plan.

So I will now hand the microphone over to Dr. Wu, and then Dr. Benkler for their starting presentations.

MS. WU: Good morning, welcome to the FCC. There are -- I have a backup copy here --

MR. GIUSTI: Irene, we won't count this

against your time.

MS. WU: How much time do I have? Five or ten?

MR. GIUSTI: Five, technically.

MS. WU: Five, technically, okay. Maybe someone could help me out. There are paper copies of the Power Point Presentation on the back counter.

MR. GIUSTI: Here you go.

MS. WU: And also copies of the dataset that are over there, if those could be passed around -- maybe you can.

I will go ahead and start, and you can sort of look over each other's shoulder while you do that. Thank you very much, John, for that introduction. My name is Irene Wu. I am Research Director in the Division of the International Bureau, which is responsible for outreach to other countries, and I am going to, I think, lay out some very basic information today about the kind of information that we have at the FCC related to understanding broadband development in other

countries.

The presentation I'm giving today actually is the work of many, many different people, and I would like to name them and ask them, if they are in the audience, to stand so you can see who they are.

First of all, Narda Jones. Is she here?

MS. JONES: Over here.

MS. WU: Oh, there. There she is behind the computer. Robert Tanner, stand up. And then Frances Gutierez.

And Cathy O'Brien -- they're a little shy this morning. And then there are our regional specialists, Anita Day for Asia.

Tracy Weisler for Europe. Patrick Boateng for Africa. Alan Thomas for the Americas. Suzon Cameron for the Middle East.

And working on the National Broadband Plan is Dr. Emily Talago, who is not here today. And working on the Pricing Data is Dr. Karen Duwani. I just want all of you to know these names, and I apologize if I've missed anyone.

But I think, going forward, if you want to know what kind of data that we have, feel free to contact any of us, and certainly we are open to your questions.

Are we closer? We're not closer, okay. All right. So, basically, I would say that there are three types of information that we're collecting: We're collecting information on national broadband strategies in a number of different countries; we are also collecting community-level information on broadband development and adoption, an assorted demographic information in a number of different countries; and also, thirdly, we're collecting pricing information from around the world.

Right now we have a collection of about 30 broadband strategies. A couple of observations and looking at these, many countries have issued national broadband strategies, in years gone by have actually completed their goals and are now in their second generation of national broadband strategies.

So that's' very interesting to look at. Also another commonality is that many of these broadband strategies have target speeds and adoption rates. They often target special communities like rural or remote communities, and many of them more recently have some kind of tie-in or relationship to broader macroeconomic fiscal stimulus plans -- are not unlike here in the United States.

To be a little bit more specific in this regard, for example, with Germany there is a goal of getting 50 megabits per second broadband service to households by 2014. In Finland there's a similar goal of getting to 100 megabits per second by 2015. And in Korea -- and I'm so glad we have a representative here today to talk to us about this -- there's a goal of one gigabit per second by 2012.

In terms of the different techniques that are being used by countries to achieve their goals, Nigeria, for example, is using minimum subsidy options to get subsidies out to build the

network. Sweden has a history of subsidizing personal computers which has been essential speeding up the rate of IT adoption there. So that's the first set of data which we have on national broadband strategies.

Now, the second type of information that we're collecting is we're developing an international dataset on broadband, collecting information at the community level. And as John mentioned earlier, this is from a stream of work that comes out of the Broadband Data Improvement Act, and so in that context we are collecting national and community level data, and we have data for about 36 countries. The data for these countries is drawn mostly from the OECD regional database from Eurostat and from the National Statistics Agencies.

And for those of you who have it in front of you, there is a table. I guess there were two handouts, the blue Power Point Presentation, and this table -- thank you, Bob, it looks like this. And if you look at the

presentation, there's a slide that looks like this. And what it is, is that for Korea, for example, we have the data on several regions: Korea divided into six regions, and for each of these regions we have the percentage of households with broadband; we have the total population; we have population density; and we have the total GDP, U.S. current dollars, purchasing power parity adjusted; and also GDP per capita; and education. And the education indicator we're using is percentage of labor force with tertiary education.

So for each of these six regions we have all this data, and this data has already been filed publicly, so it's accessible to all of you, and we really look forward to hearing from the public and from researchers on what analysis can be done with this data and what conclusions you might be able to reach about the factors that influence broadband development in different parts of the world.

The other country that is on the Power Point Presentation is France. Okay.

All right, now there are a couple of slides with graphs, and the graphs that are here actually illustrate the relationship of the percentage of households who have adopted broadband with income, per capita income. And, generally, the relationship is positive, as you might expect, but what is interesting here is that with this data, we are able to illustrate at every level of income what the range of broadband adoption is in these 36 countries at the community level. So it's at the level of detail, which is I think a new contribution to the discussion.

Just in time for the graph, thank you very much. All right, so there are two graphs, basically of the same data, and I would just point out here that this, of course, is a scatter part graph which shows the relationship here between income and percentage of households with broadband. This outlier right here, actually, is the District of Columbia, so that's us here right now here today. So if anybody can explain this to me, let me know. I'll give you my e-mail.

This is the graph that I was talking about here where you have per capita GDP on the X-axis, and so here, for example, at $40,000 per year we have this range of percentage of households with broadband between 40 percent and approaching 80 percent, depending on which community that you're looking at in this dataset of 36 countries.

Okay, third, very interestingly -- and I see right here I've neglected to mention someone earlier -- Dan Scheiman, the economist here in the front row, is also working with us on this project. The International Broadband Pricing Data, this is a stream of work that we are collecting information on broadband pricing.

We're trying to look at prices both bundled and unbundled, and these are the types of pieces of information we're collecting. I think we are looking now at 27 countries, Japan, Korea, and Australia, and this dataset, when we get everything converted into U.S. dollars and into English, we will make this available to the

public. So this will be the foundation for a competition analysis of broadband markets in a variety of countries.

We are hoping that this will be something that we can build on, and in future, these are some of the items that we want to expand the pricing dataset to look at.

All right, I think I'll stop there.

MR. GIUSTI: Great. Thank you, Irene, and thank you for so nimbly handling the technical difficulties. And thanks to the audiovisual folks for fixing that so quickly. I would like to, of course, acknowledge that we're very fortunate to have Commissioner Copps, who joined us in the room, so thank you.

And now I will hand it over to Professor Benkler.

MR. BENKLER: I will pop over there (indicating) so that I can progress. Mine is working because you already laid the foundation.

Thank you very much for inviting me. It's a thrill to be here. It's a very different

kind of presentation that I hope to offer, one that's more about caution than about anything else. And the basic question is how to begin to sync and what other kinds of sources that we're looking at and beginning to identify.

So I think what needs to be at the background of everything is this statement from Oliver Wendell Holmes, Jr.: "Certainty generally is illusion, and repose is not the destiny of Man."

If we think that by one or another dataset through one of another set of econometric analyses, we will come up with an answer that will make reasoned judgment unnecessary or wrong. And so that shouldn't be the task, but there's a big difference between that and actually trying to learn what it is that is out there and what people have done, because, basically, variation is a source of evidence. It's simply silly to ignore the experience of other broadly similar democratic societies with broadly similar market systems and assume that we are so generous that there's no one

who's like us.

At a minimum, when we find a common practice in many countries that are, broadly speaking, similar, it needs to be on the agenda as something that we consider seriously about whether it would be useful for us or not.

The second thing is that rankings, international rankings, seem to have taken on the style of varsity sports, and the argument is we need to catch up with this or we need to overtake that. And I think that masks the actual value. And the actual value is to give us an imperfect but decent judgment that says if something is accepted by this cluster of countries, it's at least not a bad idea. Maybe it's not great, but it's at least not a bad idea. If one particular country is doing certain things, and it turns out to be at the bottom of several of these rankings, that may not be an ideal country to follow. But that's very different from the sense that we need to in some sense catch up or (inaudible) at that.

The second thing is to understand that

all of these rankings have components and definitions that make it -- that circle into that meaning, so we have different kinds of things.

So, for example, this is the graph I think that everybody knows because it's played such a large role. OECD penetration moving from force seven years ago to 15 now, this is an issue. We look, we have a similar model from the ITU comparing 2002 to 2007 where we sit there in the United States, having moved from 11 to 17. So that's a certain kind of story about decline relative to relevant competing answers.

Then you have things like Len Waverman's connectivity scorecard, or the World Economic Forum in CIAD Network Readiness Index where the United States shows up at the first or the third, and again you look at these things and you say these are not mild. I say you are 17, you say I'm 14. So one of the first and most important tasks is to really go in and try to chew what are the components. Obviously, there are certain things that in the conversation we already know our

limitations here. This is a certain kind of data reported by countries, reported by carriers. It has its own limitations, it has its own nonstandardization. This, on the other hand, includes, for example, such things as judgments about the quality of universities or the depth of venture capital in a country -- again not exactly the focus of an FCC proceeding.

And so, essentially, what we need is a careful analysis of the definitions of the components of the weightings, understanding that none of these are perfect and that the target needs to be reasoned judgments about relative reliability regarding whose experience should be instructive. At a minimum we need to trim spurious claims, and that's one target, and, ideally, we identify relative strengths and weaknesses of the remaining claims.

We, basically, have several kinds of quantitative sources and several kinds of qualitative sources that all need to be brought to bear. OECD, ITU, components of all of the others

come from national agencies self-reporting, which usually is a certain kind of filter to carrier-provided data.

That's one source. There are obviously surveys of user-side reports.

Again you have some that are national statistics agencies and some that are independent, nongovernment research organizations.

There's another really important dimension that hasn't been completely -- I know, Pepper, you're going to be going in that direction -- but that hasn't been sufficiently, I think, exploited and understood, is the user-side measurement systems.

This is going to require a lot of work. I have my own issues with the set of things that are currently available, but that's another dimension. And, obviously, then there's market research.

So each of these will give us somewhat different perspectives on quantitative sources.

And then, of course, once you understand

that you're not going to get to the insignificant number, you need qualitative sources, and so the things that you're collecting on the qualitative side, the national broadband plans, are critical, the detailed reviews from various places -- academic countries, country studies, and market analyst reports -- all of these provide us with a richness that then allows us to go back and say, really, this should never have been coded as a zero; it should have been coded as a 1 for this particular set of years. But that, then, becomes very hard to fold in.

So let me just conclude with this: There are remarkably weak knowledge flows even among the well-informed. And there are smart well-intentioned people all over the world looking at similar problems, coming up with solutions, some of them distinct and some of them converging. No single equation or set of equations will replace reasoned, well-informed judgment, and the task -- I certainly see that our task at Berkman in trying to do in an uncorrelated way but I think

with some interesting overlap to what you're doing internally -- is to offer as broad a range and as transparent and cautious a range of descriptors of what's going on, who's trying what, and what is the plausible range of claims about what the outcomes may or may not be.

Thank you.

MR. GIUSTI: Thank you very much, Professor Benkler. Thank you, Dr. Wu for that very informative start to our workshop.

We are now going to turn to our panel discussion. Paul, who's already kindly introduced the panelists, let me just first lay out a little bit of structure. First and most importantly, we want a lively and interactive session. That means we're going to try our best to be rigorous with the clock so that we have time for dialogue, debate, and questions. So apologies in advance, panelists. We'll do our best to keep you within a five-minute time frame or thereabouts, knowing the realities, so it will give you all the more time for discussion later.

And, second, we want participation from the audience here and those participating on the Internet. If you are here in the audience and you have a question, there should be cards available. Please write your questions on a card and provide them to Sherille Ismail, who will be working in the room for us.

If you are participating via the Internet, Narda Jones is working the computer for us, and we'll provide cards to Sherille with questions.

So with that and without further ado, I will now turn, and we'll start with Robert Atkinson from the ITIF with his presentation.

Thank you.

MR. ATKINSON: All right, thank you. It's a pleasure to be here, and I want to keep going. Is there a clicker, or you're going to be the clicker?

SPEAKER: (Off mike)

MR. ATKINSON: You're the clicker, okay. You can keep going. Next one, please.

Okay, so I'm going to make my remarks based on a report we issued last Spring explaining international broadband leadership where we looked at nine countries around the world, some that we thought were ahead of us, some that we thought were behind us, and tried to learn some lessons both on the quantitative and qualitative -- using quantitative and qualitative data.

Next one, please. So, obviously, that's where we are. I think that one little knit is when you, more accurately, I think, should be looking at per household, not per capita. Per capita, basically, biases towards countries with small households. On a per capita basis, we're 12th. It's important, though, the data do not represent deployment; they really represent adoption which is quite different, and we don't have good data on deployment.

Lastly, there's another study that we released just this Spring called the Atlantic Century where we benchmark the U.S. against 39 other countries or regions, and on one of the

factors we used a broadband measure, a combination measure of take-up as well as quality using the Oxford Internet Institute study. And on that measure we were behind Korea and Japan, as you might expect; that we were actually ahead of the E.U. 15.

So what lessons can we draw? I agree with Yochai that it's very hard to draw lessons, I think, because there are just so many different factors that are unique to countries. And it doesn't mean we can't draw lessons, but I think sort of a kind of just unreflexive, well, they're-doing-this-therefore-we-should-do-this really doesn't fit. You have to understand a lot of the different details, and, in essence, one size doesn't fit all.

For example, we've all heard about density. Density is an important factor, it's just simply easier to do broadbanded places like Korea or Japan where you have high levels of population density. And it's not to say that there aren't other factors that are on the policy

side, but you can't underestimate these.

Next one. Geography. Related to density, but we did a study of our own where we looked at -- looking at copper loop links on the OECD nations. We could only find 13 nations. This to me would be a very useful FCC project to fill that in, but we tried our best, could find 13, and what we found was -- you can on to the next slide -- the U.S. has the longest loop links of any OECD nation. That just makes it a little bit harder, a little bit more expensive, it's one reason why some countries are able to get higher speeds on their DSL plan.

Shorter loops equals higher speeds. Next one. Digital literacy and adoption. This to me is a key one that really has been underappreciated in the debate. We did again, a little calculation where we found 21 OECD nations where we could find data on PC ownership, and the U.S. ranks 11th of the 21.

However, if we had the same level of computer ownership as the top five countries, our

rank would be 5th -- I'm sorry, that should be 11th there, not 10th. So, in other words, PC ownership explains some, but not all but some, of the U.S. lag in broadband. It has nothing to do with broadband, per se; it has to do with digital literacy and digital take-up at the household level which to me suggests that a digital adoption strategy's got to be a key component of any national strategy.

Next one, please. Industry structure -- you can go back one, please -- certainly in many countries there's public ownership of the incumbents, or there was public ownership. Secondly, you've got big, big differences on the degree of intermodal competition.

Next one, please, and this is a graph. You can see that sort of the least intermodal competition countries like Greece and Italy -- these are always CD dated from 2007 -- to the most countries like Canada and the United States with very strong intermodal competition, suggests that one might employ different policies, depending

them on the level of intermodal competition.

Next one. So what does it mean? I would argue, most importantly, that our middling rank is not a failure of policy -- excuse me, or of regulation models; it's a failure of facilitation. It's a failure of us really promoting broadband, and it's not that we have the wrong regulatory model -- and I'll talk a little bit about that with these examples.

So -- next one please -- I think three big things when you look at what other countries have done. Deployment, for example, the Swedes, if we were to match what the Swedes did on rural deployment on a per GDP basis, we'd have to invest $30 billion. So it's very laudable that we did $7.2 -- hopefully, that's a down payment. But you have to understand what the level of here on these countries.

The other piece of this, too, it's important to understand that many of these countries, the incumbents are getting a fair share, a larger share of this, larger because they

have more lines, and other countries have used a mix of both grants and tax. Loans, grants, and tax policy in Sweden, it was about 70 percent grants, 30 percent tax credits.

Korea, we'll hear more about it, but at least the data we could find, Korea on an average annual basis, we would have to put in $4 billion a year to match Korea's investment, and they've done that for 10 years in a whole wide array of things, whether it's backbone or rural or high speed.

Japan, they fund one-third of the cost of fiber networks in rural areas.

Next. Speeds. Other countries had more aggressive policies to get their carriers to adopt faster speeds. Koreans use low-interest loans. The Japanese had a policy where they let anybody write off their investments in fiber networks in a very, very short time horizon, making that a much better ROI and a much more -- a better investment.

On bundling, I think it's important we hear a lot about that big, big debate about -- I just want to raise one point about Japan where I

think there's a lot of confusion -- technically, the Japan fiber network is unbundled. In reality the cost of getting access to that network is quite high, and so SoftBank just announced recently that they're not going to really try to unbundle over that network. And in Japan, the Japanese did that largely because they wanted to give NTT an incentive to deploy fiber.

Next. Digital literacy and adoption, This to me is a key factor. I would put Korea as the No. 1 country in the world for us to learn from. They have a comprehensive set of policies all up and down the board to really spur adoption and literacy. They had a 10-million-people Internet education project; they focused on particular groups.

As you can see there, Germany's done some things, the U.K.'s done some things, a lot of countries have done very interesting projects there.

And, lastly, schools -- Korea again the model there -- have free computers to low-income

students with good grades; getting high schools to use computers more; low-interest loans.

Sweden we heard a little bit about low -- you get computers tax-free in Sweden. That program was so successful they actually ended it because their computer ownership rate was so high.

The U.K. kind of a similar program. So there just seemed to be a real nexus between hooking up schools and families and using that as a way to deploy broadband.

And then the last slide. I will just close by saying I think it's important that we not fight the last war. If you look at where the leading countries are, they've sort of won the battle, if you will, on deployment and adoption. They're now beginning to fight the battle of speed, and really applications, really working on what you could call digital transformation, getting everybody to be using advanced applications. So it's important, I think, as we go forward in this country to focus not just on adoption and deployment but also thinking about

speed and application.

So thank you.

MR. GIUSTI: We will now move to Tim Kelly from the World Bank.

MR. KELLY: Thanks. Well, it's a pleasure to be here and, certainly, congratulate the FCC for holding this workshop on international lessons. It's clearly very important to look outside our own country, and when we think about broadband now, there are more than 180 economies that have broadband worldwide.

So it's becoming not only an OECD country issue but now very much a development country issue.

And in some recent work that we published a few weeks ago, we looked at the impact, the different ICTs of having on economic growth and, as you'll see, on the right-hand side of this chart, the impact of broadband growth is actually far greater. Attempts at increase in broadband has a much greater impact on growth in GDP per capita than almost any other ICTs, and

broadband Internet greater, faster than narrow band Internet.

So broadband delivers a much bigger boost, and the impact of broadband Internet about 50 percent greater than narrow band Internet.

The key question, then, in comparing countries is what metrics to use, and there are, broadly speaking, three different types of metrics:

There are penetration, and here we can look at in terms of per 100 inhabitants per households; percentage of Internet subscribers with broadband access, et cetera. But none of those measures are perfect, and in the future we need to development measures that reflect the different composition of the usage base.

The second type of measure is price, and I'll look at some of those. I would argue that price per mega per second per month is probably the most representative measure.

And then the third type of metric is looking at service quality, and I would certainly

encourage Irene in the work that you're doing to look at the number of different service offerings available in each community. I think that's a big differentiator.

So this is similar to the graph that Irene showed earlier, Broadband in Economic Growth, but at the level of nation states. And, as we've heard, United States is somewhat less than expected. If it were performing as well as other OCD countries, then it would be on that line; it's actually somewhat below the line. It's broadband penetration is similar to that, for instance, of Estonia, but only six -- 70 percent of the best practice country which at the moment is Denmark.

So U.S. broadband has been showing a classic S-curve growth; but if we compare it to the best practice country in the area, CD area, which has changed over time, you can see that it's fallen behind, particularly since the mid-2000s. The best practice country has changed over time. In the early 19- -- early 2000s, it was kind of

dearth end career, latterly Denmark, but, as you can see, the U.S. position has slipped. If career is on a cross-country ski slope, then the U.S. is very much on a downhill ski slope at the moment.

I think this partly reflects America's different routes towards broadband. Across the area CD as a whole, DSL is the major source of broadband cable modems declining, fiber very much growing. Within the U.S., a cable modem still provides the majority of broadband subscribers, and the percentage of fiber in the mix of the U.S. is far below that of the OECD as a whole. That will certainly become an issue in future years.

Going on to look at price, here I argued that the best measure of price is to look at the average price per megabits per second based on a sampling of different service offerings.

This particular date comes from the OECD that take about 30 different samples from each country. As you can see, the U.S. Is around about halfway on the OECD on that measure, but only the price is about nine times higher than it

would be, say, in Korea.

Similarly, if we look at speeds, it's important to take an average of different service offerings by a download speed. We're forced to use advertised download speed. I think, as Irene pointed out in her presentation and Robert, too, it would be good to be able to look at actual use of speeds, but the U.S. comes, I think, 19th in the list. And this does reflect the choices available to consumers, in particular the lack of fiber in the U.S.

So what's happening in terms of stimulus packages? We recently published an analytical piece which looked at the role of broadband indifference and national stimulus packages.

The U.S. has one of the highest investments of around about $7 billion planned, but if one converts that to per capita spending, then the U.S. is clearly below other countries such as Japan, Australia, Singapore, et cetera, and also the U.S. Is targeting a much more modest target. Korea, for instance, is targeting one

gigabit per second by 2012.

I've just about used up my time, but in the slides that will be available later, you will see some of the research that we're doing at the World Bank, including our very latest information and communication for development report which came out in July.

MR. GIUSTI: Thank you very much, Mr. Kelly. You actually came in under five minutes, so the clock is up here, so I encourage our panelists to do their best to stay to the five minutes so that we can get our discussion going.

We will now move to Raul Katz.

MR. KATZ: I'm just going to use a minute, but --

MR. GIUSTI: I think it was 15 seconds.

MR. KATZ: Yeah, my objective, rather than try to organize this around some key issues or messages that I thought would be worth putting on the record for discussion, and those are five things around topics that I found were important doing my research internationally.

One is -- which has actually been discussed by the prior speakers -- one of the key variables fostering investment innovation and net. Net, what is fostering pyrodeployment?

The second one is it are we trying to maximize supply, or do we have a demand problem here? And what is the nature of the demand problem. I'm going to skip a little bit for that because that has been talked a little bit already.

The third, which I think it hasn't been which I think it an important one, is where should we focus the effort, and should we focus on high-penetrated broadband areas in order to get an additional supply shock and getting more return for the buck or the investment that we do want on broadband? Or should we address the digital divide issue, with the social consequences of that? But I think that there are trade-offs that need to be raised as a matter of discussion.

The third, the role of the public sector -- and I'm not only talking about the federal government, but I think that I'm finding,

particularly with municipal networks in terms of counterintuitive effects, of municipalities starting to behave in ways that we weren't expecting, originally, where we were banking on them as being a tool for satisfying some of the digital divide issues. And this is part of the findings in Sweden, in Germany and the like, and then some of the conclusions on national relevance.

There are four factors that drive broadband deployment, particularly the, you know, fiber or DOCSIS-3 level: Market structure -- it's been talked about; active government policy aimed to solve some of the market failures; sometimes the monopoly of waxes provided as an incentive for investment; and, obviously, density. Some of them have already been discussed.

And this chart shows, primarily, a scatter of some key countries in terms of what is this here that the incumbent telco has a broadband versus the cable? And I'm trying to focus on the top circle gives you what I would label the

infrastructural base competition markets with a percent indicating the percent of fiber deployment.

Generally, when you have a red, that means that there is some active deployment of active investment, active level of innovation. Med -- med, its market structure is critical, whether it is 2.5, whether it's 3, and if it's not, then there's an active intervention of the government by means of regulatory policy initiatives such as Japan, or even in the hybrid markets, as the case of Korea or Sweden. But, nevertheless, market structure is, in my understanding, a key factor driving investment in future infrastructure.

Supply versus demand. When you compare the little that exists about understanding of the demand gap problem, I found, you know, four observations: the pure research on the U.S., U.K.; of doing some research on digital inclusion in Germany; in the formulation of the national broadband strategy, things were found out about

this on Spain.

And all point out to the fact of the number of people that could actually buy broadband but don't, and those are the percents in the first chart on the left, 21 percent, 26, 41, in Germany 40 percent, people that have access to some sort of infrastructure but nevertheless don't buy. In the reporting of why is it that they don't, generally low relevance, lack of interest, no need appear at the top of the ranking.

And when you try to search for explanatory variables, education is on top, at least in the case of the Spanish data and the U.S.; income is important in the case of the U.K., and IRA deficient doesn't appear there; and there is some, you know, spuriousness on the data but, nevertheless, the more you see it about it and the case being when you do the regression on education, you find that Korea is the country in the world that has the largest number of years of education per household which explains the 91 percent penetration for household. Give it or

take it, it's not a technology issue; it's a cultural educational one.

Examples of demand stimulation, I think they're been referred to so I'm going to skip on this. Let's talk about this: Where do we put our moneys? Where do we focus on investment?

And, obviously, what we tried to do here in order to define that is what are we trying to maximize? If we're trying to maximize economic impact and job generation, network construction gives you a short-term boost.

If you are trying to look at positive externalities, this is the picture that emerges. If you focus -- and this is a central depiction of analysis of numbers at the county level in Germany, which is very desegregated data -- when you see these over time, if you invest more money in broadband in highly-advanced areas that's the more advanced of Germany, you immediately get a boost both in jobs and in output. If you do it in low-penetrated areas, which is primarily in Eastern Germany, you initially lose jobs because

of the productivity effect and capital labor substitution, although you start having growth that catches up over time.

Now, these raises issues as to, what are we going to do? Where are we going to focus all the efforts? But there's clearly an issue here that says maybe we're going to get a higher return in the short run versus the digital inclusion, the social effect factor.

The other one that we've been looking at is, is there some sort of saturation effect? Is there a point where more broadband doesn't mean a lot? And we still haven't found it.

We still -- we know that there's a critical mass threshold, and Waverman has talked about this critical mass threshold, but we don't know what is the point of saturation effect. And all our quadratic models cannot help us identify whether a certain geography has gotten to the point where investing more is really not something that will give us a return.

The role of the public sector,

particularly municipalities, and I'm just going to talk about the country intuitive impacts. I'm going to skip here. Look at the third dot point. What we see -- and this is particularly in the Sweden experience, some in the U.S. -- there are only 66 municipal networks in the U.S. -- but in Germany as well, is this municipalities. Once they receive a ton of public funding, start to behave in modes that would be counterintuitive relative to what was the original intent of the effort. Either they become commercial entities; either they become bottlenecks relative to the ability of deploying infrastructure and getting access to the service and therefore, you know, displaying a behavior relative to the market.

So they are trying to serve, but it is not what was the original intent. So something -- I'm just raising it as an issue. If we're banking on municipalities, we need to watch out as to what is going to be the long-term impact of that, you know, bet.

Conclusions, I think broadband model

needs to maintain a facilities-based competition paradigm, and that's pretty much the experience. I think there's a consistency with some of the speakers that have presented before. Government intervention is still important and will solve some of the market failures, but it's important that the government should clearly lay out the competition model up front, and we should avoid the sort of like modeling through the policy field that enables each of the players, and particularly those that invest, to get entering to the world announcements as opposed to active investments.

Cable versus telco is what guarantees investment, and we're lucky enough in this country where we have these kind of market structure. And when the incumbent telco enters, there's going to be a lot of investment, there's going to be active deployment. If it doesn't, we're going to get a fragmentation of the value chain, and we're going to get a lot of diseconomies of scale. There's going to be market zone where the government will have to intervene, but the way the government

intervenes has to be clearly spelled out, and it doesn't have to be a mish-mash of policy initiatives; it has to be top-down defined.

The last thing that I want to say is that if we want to maximize the impact, the technology part is just one aspect.

As I mentioned, the educational one is another one, but economic development is important as well. Everything seasoned. Remember, the loss of jobs in the disadvantaged areas. If we invest in broadband in disadvantaged areas, we might have a capital labor substitution, a broad (inaudible) effect and a loss of jobs. And we need to control for that, and that is the responsibility of economic development authority; it has nothing to do with the technology.

Thank you.

MR. GIUSTI: Thank you. Jeffrey Eisenach.

MR. EISENACH: Thank you. Jeffrey Eisenach. Well, thank you, Paul and John, for having me here today, and I'm going to -- I'll try

to keep to my five minutes. I notice it hadn't started yet, so take your time hitting the button. I'll do my best.

I want to make three points, and I'll try to make them quickly. And, obviously, we could be here forever talking about a lot of these issues, including some of the ones I'm going to raise. So probably no surprises here, but let me just point out three issues that I think are worth paying attention to.

The first is -- and I want to emphasize I think that I don't envy, you know, your all's task, because I think that international comparisons are very difficult to do well -- there are data problems, measurements, specification and interpretation. And, frankly, because of that, a lot of these data I think tend to be misused.

Secondly, clearly we can learn -- and I'll talk just very briefly about some of the things I think we can learn, and then I want to just very briefly emphasize some of the conclusions I've come to in looking at the U.S.

when compared with other countries around the world -- so why do we look at international comparisons? What do we hope to learn? First of all benchmarking. Everybody wants to know, how are we doing relative to the other guy? Now, that's a dangerous exercise, and so I'm going to talk a little bit about why: Because the data's often not very good, and simple-minded comparisons are not very helpful, but we are still interested, naturally, are we doing well, or are we doing poorly, and there's some legitimacy in that?

Secondly, the world is running natural experiments for us, right? And as research ruses economists, as statisticians, we like to take advantage of those natural experiments to the extent we can. The problem, again, is that a lot of times it is very difficult to find the other things equal seteris paribus conditions to identify control variables and actually do valid empirical work. I think it's hard to do that.

Longitudinal analysis is the best practice, and I would like to hear more from

Yochai, I guess, about his notion that if lots of people are doing it, it's a good idea. I don't necessarily think I agree with that, and maybe I misheard it.

But I don't think sort of a majoritarian approach to what policies are being adopted is necessarily good guidance, but, certainly, what policies are working elsewhere is good guidance.

And if we find that certain policies have been adopted in certain countries and have been systematically successful, that is a good indicator.

And then, finally, economic and social impacts, we're clearly interested and, you know, have done a lot of work, good work, as been done on this, but a lot more to be done. What is the impact of broadband on things that we care about like economic growth.

What are the challenges? I'm just going to hit these very quickly. Measurement: both outcomes and policies are difficult quantify -- I think we all know that. I'm going to give a

couple of examples on the dependent variable side. I think it's very difficult, for example, to measure prices when you have product heterogeneity. It's difficult just to quantify what does "unbundling" mean? I mean one of the questions is, how hard -- how well did we do enforcing unbundling policies in various countries? There are lots of unquantifiable -- there's a lot of noise in the data as we look at these variables.

Specifications: relationship between variables. Can we model pricing in multiproduct industries? And one of the things we have going on here is we're looking at a broadband sector, but everywhere today the broadband sector is really part of a communication sector that includes video and voice.

So as we try to look at, for example, data prices, can you -- does it make any sense to try to segregate out a data price in a world in which the network is carrying video and voice as well?

And then interpretation. You know, is "higher self" on penetration a good thing or a bad thing? You know, we used to think it was -- maybe it was a bad thing because it was an indicator of how bad the land line network was. If you look at land line penetration now, it's falling fast just in the most advanced countries.

I'm sorry, I should have had that slide up there as I was talking about those things, so there was a slide.

But let me give an example of measuring broadbands' prices, and so this is, you know, the U.S. ranks 23rd in the world in broadband prices between the Slovak Republic and the Czech Republic, very high prices. This is on a price-per-megabit basis. I actually disagree. I'm not sure price-per-megabit is the most valid measure, but if it is, then you would see that the U.S. has relatively high prices.

This is another chart from the same OECD report showing that the U.S. has very low broadband prices when it comes to entry-level BSL

pricing. If what you're trying to do is increase household penetration, maybe that's the relevant variable. Are we getting people off of dial-up and into broadband? So there's an example of where the concept of what we're trying to measure is really the problem, you know. It's not so much are we measuring something accurately, but the concept.

But there are also problems just in terms of accuracy. This is a chart that got a headline last week in The Wall Street Journal: Self Unuser in the U.S., Canada, and Spain Pay the Most. This is the OECD 2009 Outlook Report, and they put up some data showing that the U.S. costs $635 for a medium-usage cell phone plan in the United States, far more expensive than any other country.

Well, that's because they looked at AT&T, which does not offer a kind of low-usage plans; in fact, a medium-usage plan in the U.S. is -- in the world is so low by U.S. standards because people around the world don't use their

cell phones as people in the U.S. use their cell phones. So the fact of the matter is, if you go to the AT&T website and try to find a cheap plan at 700 minutes a year, and a few hundred text messages, you'll find that the U.S. looks very expensive. But if you spend 45 seconds, as I did, and go to the boost mobile plan website, you'll find that you can buy that medium package of use for $140 plus taxes, making the U.S. the lowest price country in the world.

So whereas I guess there are a lot of people wringing their hands last week that the U.S. was the most expensive country in the world, the fact of the matter is, if you shop around a little bit, a little better than the OECD did, you can find that we look pretty good.

Now, in my conclusions I won't dwell on these, but there are some things that we can learn and some things that I think -- some areas where I think it is more difficult. In particular, I think simple-minded comparisons, for example, where is the U.S. done on trend line relative to

other countries, looking at just GDP and broadband adoption on a per capita basis, I think that kind of data is unhelpful to the discussion.

Now, what do we know about the U.S.? Just very briefly, we know that the U.S. is the most competitive market in the world by kind of any metric. We've already talked about cable modem versus DSL. I think the data that was put up a minute ago on fiber is misleading. The U.S. will be the third largest fiber market in the world next years, I think, by most projections. And dozens of other land line or fixed wireless competitors, we clearly have the most competitive wireless market in the world, so -- or maybe second to the U.K., but very close.

The second lowest, too, from concentration ratio, I think it's the lowest HHI of any OECD nation. And we have continuing entry with Clear Wire, Cox, and T-Mobile now entering with broadband as the AWS spectrum comes available.

So just two quotes to finish up. First

of all, as the OECD says, in the United States where cable modem is more prevalent than DSL lines, competition is leading to network upgrades. I think that's the point that was just made. AT&T and Verizon, what we're seeing is the cycle of innovation where the cable companies come in with a faster product, Verizon shows up with a faster G-Pon products, and the next thing you know we're into DOCSIS-3 on the cable side. So we're seeing that kind of competition at least in urban areas.

What do we know about infrastructure competition? Even Commissioner Reding agrees, maybe surprisingly, that infrastructure competition, when you have it, is the best recipe for competition, or the best recipe for growth and penetration.

And that completes my remarks. The bottom line is I think the U.S. is doing remarkably well relative to the rest of the world and that as our -- as competition continues here, you're going to see us not only catching up but surpassing a lot of the countries. Already,

really, we're ahead of the European Union and, you know, looking at Japan and Korea as countries that were very successful with subsidy policies in the past, but where I think our pro-competition policies are going to lead us to catch up pretty quickly and are offering more choice and variety than virtually anyplace else in the world.

Thanks.

MR. GIUSTI: Thank you. Deborah Lathen.

MS. LATHEN: Good morning. It's really a pleasure to be here. It's like a homecoming for me. I was here at the FCC 10 years ago -- can you believe it or not -- when we were -- we wrote the first report, Understanding Broadband.

Do you remember that one, Pepper? So it's a delight to see, really, how far we have come just in that short decade.

But I'm here today -- although I am an American, I'm here on behalf of British Telcom -- to really explain to you, I'm a nonexecutive member of the board of directors of British Telcom. And I wanted to share with you today some

of the things that's going on in the United Kingdom, okay, and so I don't have a power point. I just have some written comments.

As in the United States, there is a recognition in the U.K. that broadband is critical to the country's future; and, as in the United States, the U.K. government is grappling with broadband issues relating to availability, affordability, investment, and take-up. In June this year, the U.K. government published its Digital Britain Report, which lays out the U.K government's views and policy commitments on broadband.

And I'd just like to summarize some of the findings from the Digital Britain.

First, there is intense broadband service competition in the U.K. There are approximately 700 national and regional ISPs that compete to serve a population that is one-fifth the size of the United States. There's essentially the size of the state of Oregon, where we have 700 ISPs.

Over 99 percent of the exchanges in the U.K. have been enabled with ADSL service, and over 89 percent of homes get at least two megabits or higher headline speeds. The average broadband speed in the U.K. right now is about 4.1 megabits.

The U.K. has one of the lowest average monthly subscription rates for broadband among the OECD countries. And among the G-7, the U.K. has moved from the laggard position in 2001 to leadership in 2009 in terms of broadband penetration.

In fact, 28.5 percent out of every 100 inhabitants in the U.K. Are subscribers to broadband, and that is only second to Canada.

But despite these achievements, the U.K. government recognizes that more needs to be done, and so in a Digital Britain Report, it announces intention to achieve universal 2-megabits broadband service in the U.K. by 2012. And by 2017, it intends to achieve deployment of superfast broadband to 90 percent of U.K. homes.

On universal service, the U.K.

government's target is two megabits to every U.K. home by 2012, and we certainly believe that that is achievable.

The 11 percent of 2.7 million U.K. homes that cannot get -- there are about 11 percent of U.K. homes that cannot get 2-megabit services, and so we are -- that's being addressed by sort of interest, and the government has set up a fund. It's basically -- they say "levy," we say "tax" -- a six-pound per annum, which is about $8 per annum per subscriber. No, it's not?

SPEAKER: That's for the next generation access.

MS. LATHEN: Oh, that's for the next generation access. I'm sorry. But it's six pounds per annum for next generation access. They anticipate that's going to give about 150-to-200 million pounds, and that fund will be used to fund the remaining third of Bretons that cannot get two megabits. So that's sort of an interesting approach. I don't know how popular that would be here, but and there are also funds to get to reach

the two megabits that were left over from the digital switch-over. So those funds are being used, too, to ensure that everybody gets two megabits.

The next stage of the U.K. government infrastructure plan -- I've got a minute left -- is to achieve super-broadband deployment. And let me tell you what -- British Telcom is the main investor here -- we're investing $1.5 billion, and Virgin follows behind. This Virgin is using DOCSIS technology, but we have invested that, and our investment, we will have -- our network will be open to all competitors. We currently have our networks open, and we provided the same quality of service and access to all of our competitors. The only consideration that we got in this regard was that we can have flexibility in terms of pricing, but the government has made it clear to us that they will be looking to see if there's any margin squeeze.

So the point I guess we want to make here is, we have built -- we are building a

private network, it will be an open network, it will be a highly competitive network, and our experience in our infrastructure which we have functional separation, we have found it to be profitable. We, in fact, in open reach, our competitors, we are judged by the quality of service we provide to them, and we actually give bonuses to our employees in that enterprise for that.

But since I only have 16 seconds left, this one thing I do want to talk about, and that is what we are seeing in the U.K. is not just BT, Tiscali, and others, we are providing -- our plan is to provide superfast broadband, not to homes. Here we have competition between cable and between the telcos, but that's for households. We will be going to small and medium enterprises. There are approximately, in the United States, 27 million small businesses that really don't have access to the type of high-speed Internet that we will be offering in the U.K.

In the U.K., a small business can get --

you can get video-conferencing; you can get cloud computing; you can get all kinds of things so that you can really run a small business.

And we're talking about people that are not working from their homes who don't -- who may not have access. So that's one of the key components that I think is very critical for you to consider is how we use service to small and medium business enterprises as well as the large enterprises. Because, as you know, when you look at the United States, the cable modem, the cable does not take you to those small enterprises, and I think that's very important for an economy.

And then another thing I'd like to state, with 53 second left, is that we found in the U.K. that regulation does not have to be a disincentive for investment in infrastructure, that the two can actually -- we're making, as I said, a $1.5 billion investment. And I don't know if you saw our last earnings, but they were not exactly where we would have wanted to be, but we are making what some would call a risky investment

because we have a regulatory policy that we believe will enable us to make a return on that investment.

MR. GIUSTI: Thank you very much. Mr. Noh?

MR. NOH: Thank you for having me to your important workshop this morning. This is my honor and a great privilege to tell you about Korea's humble experience related with broadband deployment policies. I am well aware that we have learned much from the United States and from FCC in the fields of telecom and broadcasting in many ways, so it would be our honor if Korea's experience could give some insight and contribute a little in the process of developing your nation of broadband plan.

And I -- excuse me, two things: One thing is I could not prepare the power point because of the time limit; and the second thing is I am a slow speak. Though the broadband speed of Korea is very fast, but I am slow, so excuse me, (inaudible) Mr. Giusti.

Let me explain the current status of a broadband in Korea (inaudible). A broadband subscriber per 100 inhabitants reaches around 31.2. It's ranked about a seventh, number seven in the world, and the household penetration rate is about 95 percent. An average downloader speed is 43.3 megabit PS, according to OECD statistics. And LTPH's subscribers' rates has reached to 12.2 per 100 inhabitants, and by the end of 2008 finally, Korea's nationwide broadband network was deployed with 100 person in coverage. And 60 percent of a household has access to broadband Internet up to 100 megabits.

Now I would like to see some key enablers, some success factors of Korea's broadband network deployment. The first thing is, is establishment of a comprehensive informatization promotion framework, I think. In Korea, we use informatization, the meaning as the promoting broadband deployment and adoption, and usage in public and private sectors. In order to establish this framework in Korea, a special act

was enacted in 1995, and a special task force team also was set up. And this was later developed to the national informatization planning office, and the special government fund was also established by the law.

And one more important thing is that for the higher-level decision-making, intergovernmental special committee was established in 1996, and the chairman of the committees, prime minister, and all the cabinet member ministers was also the member of the special committee.

And, number two, the establishment of a national master plan just like now FCC is trying to make, national master plan for the informatization. And the Korean government made all fifths master plan from the 1996 to 2002. And we presented the vision and the strategies for the coming Information Society through this master plan.

And the important thing is that all ministries in the U.S., all departments in

executive branches participated and prepared its annual action plan, implementation plan, according to that master plan, and every implementation plan were reported and evaluated by that special committee regularly.

So the master plan and implementation plan were closely linked and worked together. In other words, every ministry in Korea are well aware of what they should do every year for the deployment and adoption and the usage of the government side.

And, number third is the government leading investment, in order to encourage to promote the investment with telecommunication company in the initial stage, Korea had a government-funding program. And telco constructed and owned a debt (inaudible) network as some other panelists explained.

They owned a debt (inaudible) network, and the fund from the government was offset in the form of a broadband service charge for the government. This policy facilitated the first

construction of the debt (inaudible) network, we think. And also, their promotion of a market competition is definitely essential.

And the fifth, the last and not least, is demand the generation policies, demand the promotion policies. Korean government started e-government projects and services to promote and facilitate government-side demands. And we decided to provide free Internet service to all schools in Korea from elementary to middle, to high school, more than 11,000, in order to encourage broadband usage among the young generations.

And the other thing, also, interviews that we started nationwide illiteracy program. It was this program providing more than 10 million Korean people, almost one-fourth of the total population provided government-subsidized debt costs for that program, and included the people -- housewives, military personnel, students, and senior citizens, self-employed persons, et cetera.

And the last thing I want to say is that

we introduced a kind of a premise network certification program, encouraging a voluntary participation to adopt broadband network by labeling government certification mark to apartment that that qualified some spand-out of broadband speed. This program contributes a lot in increasing property value, also, the apartment value, also. So now in Korea, it's almost essential to have this certification mark in order to sell both kind of apartment, a little higher price.

This is my overall statement, and if you have some questions about Korean case, I will talk later in (inaudible).

Thank you for listening.

MR. GIUSTI: Thank you. And now we will have Bob Pepper bring us home to our last presenter before the panel discussion. Thanks.

MR. PEPPER: Thank you. Thanks for the invitation, and it's great to be back.

I'm going to go through some of these quite quickly for time. I'm going to talk about

and present material. Three studies that we've done or been involved in, I'm actually going to talk about two of those and focus on one of them.

The first study was a chapter in the Global Information Technology Report a year ago that's published by The World Economic Forum and NCN. And what we did is we took a look, and we mapped over 110 countries looking at an ICT ecosystem and ICT infrastructure. And the point I want to make here is that we're talking about broadband, but it's not broadband in isolation. Mr. Noh just pointed out that there is a Korean national goals for informatization, and how one uses ICT in society in business. And, actually, we think of this as much more multidimensional -- I'll come back to that.

We used standard data from sources like the World Bank, ITU, OECD, et cetera, and on the vertical axis is the ecosystem which includes ICT policy regulation, market competition variables, general business climate: How difficult is it, for example, to start a business?

On the infrastructure, the X-axis, we took a look at both soft infrastructure and hard infrastructure. So it's skills for ICT, the integration of ICT in business and government, domestic networks, international networks, adoption of technology. And what we found, not surprisingly, is that if you're in the lower left with poor infrastructure, poor ecosystem -- and, by the way, I want to make sure that everybody understands this is correlational, not causal, and we can talk about that more in detail later -- but if you're in the lower left, it turns out you have high prices or high costs for connectivity and low broadband penetration. If you're in the upper right, you have lower costs for connectivity and much higher broadband penetration.

So where's the U.S.? I'm going to go through a series of slides to sort of give some comparisons with other countries, and then we can unpack that in the conversation. So if you compare the U.S. with what people call the best practice countries, you can see that the U.S. is

clustered sort of in the bottom third of the best practice countries. But if you take out the very small countries, the city states and the small population/small geography countries, you can see where the U.S. is compared to countries like Japan, Australia, Germany, Canada, U.K., and France.

Interestingly, Korea is not on here, but Korea is the gray dot just probably, you might want to call it, 7 o'clock to Japan.

SPEAKER: Here?

MR. PEPPER: Oh, good, yeah, that is Korea, thank you. And the reason that Korea was not included among the best practice countries here was not because of the broadband but because of some of the issues of the integration and use of ICT, actually, in the business place, notwithstanding some of the other activities for the National Plan for Informatization.

Compared to G-8 countries and G-20 countries, you can see how the spread, if you go back to the G-8, they're all clustered. And once

you add the G-20 there's a lot of countries that are down here that are still emerging in terms of their economies, and every time we meet with government officials they want to know: How do I move from the lower left to the upper right?

The second study, which I'm not going to talk about now but we can talk about later, was a chapter in this year's GITR Report, which actually took a look at 157 countries, and we took a look at various characteristics of Internet and Internet adoption, including broadband from proto-Internet and early days up to intensive -- you can see the distribution of the 157 countries again using publicly available datasets, and, not surprisingly, based upon the last year's study of the U.S.'s clustered within the intensive use which is defined as 50 percent of households actually adopting and using broadband.

Well, I'll just spend most of my time on -- which is almost up -- is to talk about another dimension of broadband which is actually a study that was conducted by Oxford University and the

University of Oviedo last year, and that actually takes into account some of the critique that people had talked about earlier.

You know, broadband is not just about speed, it's multidimensional. It is both speed, it's latency, it's jitter, it's symmetry, it's burstiness, and there are other variables.

And one of the things that the way I like to think about it is that when you ask the question about broadband for what, it really should be application-driven. It should be about, what is the broadband to serve what purpose? And then if it's application-driven and user-driven, because, ultimately, if you go back to the first study, it's how people use this technology and the services and the broadband; it's not just having it there, if it's not being used, who cares? And so not all bits are actually created equal, and if you match -- begin to match broadband to applications.

So, for example, the very simple example is you can have two applications that only require

64 kilibits, e-mail and voice-over IP. E-mail is not sensitive to latency if it comes 20 -- you know, if it comes a minute later or 30 seconds later, you don't care. Voice-over IP doesn't work with high latency.

So what the people who did the study at Oxford did was actually create two baskets of services: today's services, social networking, low-definition video conferencing, you know, small file-sharing, and actually came up with a metric based upon a Delphi study for both the applications and the speeds required, and basically determined that about 3.75 megabits down, one megabit up, and no more than 95 milliseconds needed to provide and service today's applications.

Tomorrow's applications which actually exist today in enterprise, universities and actually increasingly among consumers, include visual networking, high-definition streaming, high-definition IPTV, consumer telepresence and the like, and that requires about 11 megabits

down, five megabits up, and a latency of no more than 60 milliseconds.

So, then based upon that the study actually developed an index looking at what they call the, you know, broadband quality index to BQI for the broadband quality service with a threshold of, on the metric 32 and 75, based again the Delphi study in determining the balancing between download, upload, and latency in the model. You can play with this and change your own dimensions and come up with your own metrics and actually test it.

This was then tested against eight million records that were sourced from actual tests from speedtest.net Yochai talked about -- you know, speed test and some of the other metrics that are now publicly available. And based upon this, we looked at -- or they looked at 42 countries, and if you take a look at today's applications and there's some, you know, standard deviations, basically maybe from, you know, Latvia, Korea over probably to Australia and

Luxembourg, it's all within a standard deviation.

Some of these, by the way, which I'll talk about in a second, are a little bit misleading because it's only among existing broadband subscribers, so if you have low broadband penetration, right, you may have very high quality among a very small sample, so you need to begin to look at that.

For tomorrow's applications there is only one country that actually had a network in place that could meet tomorrow's applications, and that was Japan. So if you compare this, though, to some of the other metrics, and if you actually -- oops, if I go back -- if you think about, you know, the relative rankings of where countries are, when you take a look at the broadband adoption, pure adoption from the OECD, it's a completely different ranking.

And if you take a look even at the advertised average download speeds when they are actually tested, they turn out not to be what's advertised. And so you actually have to take a

look at what's in the network and what's available.

So if you think about this on the vertical dimension of the quality and the horizontal dimension as penetration, you have quality leaders and penetration leaders, and what you ideally want to do is figure out, right, you know, how these match and, you know, and cluster, and then another, the other, you know, 20 would actually be down in this range down here, which would be sort of emerging and aspirational.

So what are some of the lessons? No. 1, an ICT ecosystem is more than just broadband because it also has to go to other variables in terms of using ICT. Broadband is the necessary but not sufficient prerequisite for all these other things happening.

No. 2, there's a multistage path to ubiquity in the benefits. First you have to have it available; second, you have to have people actually adopting it, subscribing; and third, you actually have to have utilization, people using it

at increasingly intensive ways. And I think some of the discussion is already talked about: How do you drive demand, you know?

Raul, you talked about that, Rob, Yochai, and Tim. And then, finally, broadband itself is multidimensional, it's not static. Quality actually makes a huge difference, and so you need to think about it from the application layer up in terms of what the demand is to meet the needs of particular kinds of broadband applications. And those applications are going to increase the demand on increasingly higher quality of broadband and quality incorporating at least the three dimensions of download, upload, and latency.

Thanks.

MR. GIUSTI: Thank you, Bob.

MR. DE SA: Maybe we'll start the discussion just to pick up on something that you said, Bob. Maybe Mr. Noh and Ms. Lathen can comment on if you accept that broadband is not an end in itself but a means to an end. What would

you say that some of the sort of socioeconomic benefits that other countries are getting today that we're not getting in the U.S. Because of our broadband infrastructure?

MS. LATHEN: Well, you know, one of the things that I didn't -- am I on? Okay -- is, for example, in the U.K. with the launching of this broadband, we will be using this for the -- controversial issue -- but the public health. Public health information, we'll be able to use it, you know, for the national health service there, which doesn't look like we're going to get one here. But, and so, you know, the public health, public notices, also, as I previously mentioned, small businesses can really have, can be a big business because we are going to be bringing -- well, they already have the ability to do cloud computing, whereas you can't do that here. You just can't do that, so that's some things that come to mind straight off.

MR. DE SA: Mr. Noh for Korea, what might be some of the benefits that you see in

Korea?

MR. NOH: About utilization. One survey said that now there are most -- what part, or what kind of a usage in broadband is to get information. Three or four years playing a game, it was changed to get information. And second is to usurping or the kind of a game. So in Korean government, we will try to stimulate the private side adoption and usage by supporting the making contents or the e-government project for on-line banking or night trading by introducing electronic signature system to secure their e-commerce transjection. That kind of a policies or measures was effective, I think.

MR. ATKINSON: And the key benefit is in education. I think that came out of several presentations. If you look at the OECD statistics, the piceous of a -- which looks up to educational attainment and look at the countries which have shown the greatest improvement in educational attainment schools, it's no surprise that countries like Korea come out on top of that

list.

I think we talked earlier about the fact that Korea made the decision very early on to provide free Internet access to all schools, and I think it's reaping the benefits from that.

MR. GIUSTI: Sure. I guess I'll direct my question to Mr. Katz, but I would love someone else to join in in the answer as well.

And one -- a number of speakers, and I think Mr. Katz among them, talk about the importance of competition and facilities-based competition, I believe, in particular there.

But I was also curious as we're looking at the challenges of reaching outside of urban areas to rural areas, what policies you have seen, what other policies do governments have to have in place, or incentives or subsidies to address the challenge of reaching outside of urban areas?

And I would welcome your thought, and perhaps somebody else wants to join on that.

MR. KATZ: Yeah, I think that the prevalent philosophy right now is to recognize

that if you go beyond urban, suburban, and areas with high pockets of demand, you have to solve for that failure in some way, shape, or form. And these concepts of geographic segmentation that either (inaudible) come, and even some of the regulators in Europe are exploring right now, or implementing, is one that says, well, you have four areas and for each of them you have to define a set of incentives. Obviously, for those where you have like a big pockets of demand, it's free competition and intermoral. But if you go to some of the remote areas, you'll have to either assign, provide some monopoly rights controlled by the regulator and that ensure an adequate rate of return and allow these to work.

I think that one of the things that we haven't talked about, though, is that if you look at the other side -- I mean purely from a private sector standpoint -- very few carriers today are making a rate of return on the investment in fiber.

And that's something that needs to be

considered because ultimately -- I mean everyone is to get some sort of a return on that particular investment, and it's -- and the reason why, for instance verging media in the ORCAs investing less than BG is because it takes less money to implement DOCSIS than it is to implement FTTH or FTTC.

So, and therefore the cable guys have a better rate of return than the incumbent telcos. But definitely, this notion of geographics segmentation is critical. The monopoly rights supervised by the regulator are some things that are being explored, and that is the way the economics will work.

MR. GIUSTI: If -- one other person wants to comment on that, or --

MR. ATKINSON: I'll just comment, I think the key is when you look at what other countries have done that have had success there, it boils down to they use subsidies. And there's different forms you can do that.

And the second thing I think is to not

fund multiple providers. They tend to fund one provider, and they spread -- they don't spread their funding around inefficiently, as I think we've done in the past year in this country.

MR. DE SA: Picking up on that, one of the other things we didn't really discuss very much was technology. I wonder if anyone -- maybe Bob or anyone else -- would care to comment on the use of, you know, fixed wireless versus cable, versus fiber, versus DSL as a way to improve sort of access and deployment of infrastructure.

MR. PEPPER: Yeah, so I think a couple of people made the point, Paul, that -- I forget, was it Rob, did you have the loop length slide? So, you know, in Japan, you know, there's the provision of up to 45 megabits over copper loops using BDSL loops are very short.

So, you know, there, each of the technologies have advantages and disadvantages, but it's clear that if you're talking about being able to serve very high-quality of broadbands in the future, you need to think about the network

segmented core middle mile and access. Most safe the discussion has focused on the access. In fact, you know, DSL, fiber, DOCSIS, wireless, people tend to, you know, focus on the last -- the last mile, last, you know, five miles.

But there are there parts of that network that also are just as important if you're going to have wireless broadband, which I actually think is going to provide very significant actual real broadband access, you have to get broadband to the tower. In a much higher capacity is playing the fiber to the tower and the antenna because, you know, we talk about mobile networks -- the networks are not mobile, they're fixed, the people are mobile -- and you have to get super-high broadband to the tower.

So I think it's going to be a mix of technologies. Especially in the rural areas, because of the density issues, it's going to be increasingly wireless plus fixed and mobile, but it's going to have to be wireless technology optimized for true broadband that goes beyond 3-G.

So it's going to have to be IP-based, which you're looking at OFDM types of technologies like LTE and WiMax. But I think it's going to be a mix.

MS. WU: Actually, if I could add something on that, this is an area where, interestingly, countries which don't have as long-established networks are a little bit more free to experiment with different kinds of technologies. And I did just recently look at an example in Chile where they have a history of using minimum subsidy options, and they recently awarded a fixed wireless -- I believe it's a WiMax license -- to an operator for a rural area. I believe it's closer to the Antarctic, that section of Chile which is closer to that part of the world.

So there are a lot of examples out there of experimentation with different kinds of technologies, and some of the countries with more of an open network comes into --

MR. PEPPER: I want to show you this example in that what they also did was they had a

backbone. They needed a broadband core network, and if you think of the geography very long and thin, and they actually -- the government did provide government funding through a competition. But it's basically a government-funded new fiber backbone that went all the way down there, so that you have to have the fiber core to have something to connect to; otherwise you're going to have, you know, the WiMax access network, but if it doesn't connect to broadband, then it doesn't do you any good.

MS. LATHEN: We have been working with what's called BET -- that's not the Black Entertainment Network -- which is the Broadband Extension Technology, to try to upgrade some homes that are getting below two megabits, and we have had some success with using this broadband extension technology, you know. So that's one technology.

The other thing that's being considered in England, and I'm not suggesting that this is the approach that should be taken, but it's under

consideration, is the extension of 3-G spectrum licenses. Actually, there has been discussion about spectrum giveaway to encourage wireless companies to go to rural areas of the U.K.

We have some questions about that. We don't know what impact that has on new entrants if you're giving away spectrum.

Also, you're giving away, you know, a taxpayer asset for free; we're not certain that that's something that should be done, but that is -- I just bring it up because that is something that is under consideration.

MR. KATZ: The only point I'd make, very briefly, is that there are a lot -- every solution seems to be using a different technology, and maybe the key here is to think technological neutrality.

You know, in Australia which I'm familiar with, for example, they have deployed a 4-G network delivering 14.4 megabits. I've used it. That speeds to 98 percent of the population, you know. Off the Great Barrier Reef in an

airplane at 2500 feet, you're getting 14.4 on your laptop, which is pretty astonishing, and I don't know that that's the technological choice, and I don't think any other carrier in the world would make or would want to make. It was the technological choice that seemed to have been right in that circumstance for that carrier.

And, you know, same token: Who wants to bet on WiMax versus LT today? You know, if there's anybody in this room think they can make that bet with tremendous confidence, or would you be better in a mutual fund, you know?

MR. DE SA: Mr. Noh, could you talk, maybe, a little better about how the Korean government's thought about the technological choices?

MR. NOH: Maybe about five or six years ago a major subscriber used the ADSL, and now, as you now well, the convergence between telecommunication and broadcasting needs more capacity, more band raises. So now the providers moves from the ADSL to FTTH. I almost imagine

that so high penetration of FTTH when I come to the United States, and two years ago it was not so high. Within two years it's competing with Japan in the FTTH penetration rate.

So, personally, I think that it depends on the needs, of the customer's need. If they need more band raise, the providers will make any ways to provide their needs. They will take their advantageous technology. For in Korea, somebody said our democratic is more than 70 people lives in urban area.

So it is easy to connect FTTH or ADSL, so our major ISP tries to provide the FTTH.

MR. DE SA: Great. Thank you. Should we maybe open it up for questions from the audience? We've got several questions from people in the room as well as some from the audience.

MR. GIUSTI: Maybe they could speak to the mics, so it could go over the Internet.

MR. DE SA: The first question is: What role does policy play in meeting the social debt to provide broadband to rural and remote areas,

given that the largest jump in deployment indicators may come from increases in investment in urban or high density areas?

Mr. Katz, I think you mentioned that.

MR. KATZ: Yeah. No, I think that definitely -- I mean, Paul, he sees -- is going to address that market failure. I would leave, probably, the urban and suburban areas with high pockets of demand alone because competition gives you enough of a dynamic to facilitate an investment.

The other thing, I would parry it back to the issue of the need, and I'm raising it as a question as opposed to having an answer, is what are we trying to maximize by giving 20 megs in a rural area, assuming that maybe the requirement is not there. Be on the digital inclusion on the social policies, and if -- all our analysis indicates that if you want to get a high impact, you're going to raise that to 50 meg or 100 meg to those poor development areas that are generally in the corridors and in the metros, and that will

have the highest impact.

So to bring it back is, I wonder what is it that we're trying to maximize. I always try away from the stretch targets, and we tell these to a private sector counterparts in saying, well, the target is somewhat of an embodiment of one of my objective: What are you trying to achieve here? And rather than talking about percentages is, what are the objectives that we're trying to meet by, you know, developing this plan? Is it inclusion? Is it economic impact? Is it general welfare? Is it increasing the level of education?

And from there we derive the targets. And things are going to fall very nicely because, in fact, as you say -- I mean, you know, there's prayer or deformation about the value and the suitability of all these technologies.

MR. ATKINSON: I have a slightly different take on it which is I don't -- there are many, many things in the world that are tradeoffs, and I don't think these are the tradeoffs.

It's inevitable that we will have close

to 100 percent penetration in the U.S. on broadband, and the real question is when. So it's like if we're going to do that, my view is we have to make that investment. Sooner is better than later.

There will become a time when virtually every single home in America except the most farthest-reached, you know, home up on the mountaintop, and they'll probably get satellite and maybe grade 4-G; they'll be getting it.

So I think that suggests we're going to have to make that investment because we're going to have to subsidize that in some way, shape, or form.

And, secondly, I think -- I think we're going to need to have policies to raise speeds. I don't think the marketplace is going to do that on its own. I think there are, certainly, directions that the marketplace is going, but as we wrote in a report recently, there are big externalities around speed.

Companies -- you know, you don't need

speed unless you have application; you don't have applications unless you have speed.

You have a classic chicken-or-egg issue, and I think that's where Korea and Japan and to some extent Sweden have tried to sort of square that circle.

MS. LATHEN: But I think that if you're talking about you have to have speed, I think it's very critical with respect to the question that was asked, is adaptation: What makes people want to do it? I mean we saw a slide as to this, is 60 percent of people who had the financial ability to do it just had no interest in it.

So at some point -- I know this panel isn't about it -- but you have to talk about what is the content, and what are the applications for this broadband that will make people in, you know, underserved communities or even in fully-served communities want to adapt it? Because right now we see cable passing, what, over 80 percent of American homes? Something like that? And yet when you hit minority communities, you do not have

the uptake for this. So what is it from a content perspective that is required for adaptation once you have deployment?

MR. KATZ: Just I'm sort of torn because I fully agree with what Rob says about the speed, yet the data and the research still is not indicating that. I mean the little research that we have on speed goes along the lines of all the causality change that you are talking about: Applications times speed gets externalities. But we found it quite a bit going from dial-up to DSL. We still haven't found it on the next step. That may be because it's too early, or maybe because we have to go to Korea and find it. But, you know, the data is still not there.

But I fully agree with you, so I've lived sort of torn between --

MS. WU: May I ask a variation of the question, then, given that you have identified in your research some areas where the introduction of broadband might not lead to an immediate increase in jobs or productivity. What would need to be

changed about those environments that would get them into the position where they could experience the benefits of broadband a little more quickly, since this is not a static situation, right?

MR. KATZ: I mean going back to what was mentioning on the SMEs, for instance, SMEs benefit from broadband. But a key link there is the applications and the literacy of the SME owner as to, what am I going to do with this? And it's amazing. Each time you survey the SME market, the small and medium enterprise market, is you find that beyond the strict financial applications carrying some sort of a very basic general ledger, the owners of small and medium companies don't understand what it means in terms of the power that they have in their hands.

So when it comes to training, I think the Koreans have been very good about emphasizing the level of education of the SME market, because, ultimately -- I mean it goes back. I mean, you know, no matter where you look at, each economy has 80 percent of the economy that are small and

medium companies. And you go to some of the states, I mean and it's like 95 percent.

Well, what are we doing for them to understand? I go back to the notion technology is just one piece of the action, and what was emphasized by the Korean case is -- is the coordination across government instances for comprehensive policies, where, you know, the education, technology, economic development -- all of them have to be aligned. This is not just a matter of technology-related ministries, because if you do, you're just about to (inaudible).

SPEAKER: Exactly.

MR. PEPPER: So to reinforce what Raul said, is that this is again something that we're seeing globally. In fact, you know, we keep coming back to Chile with some projects that we're working on there where working with small/medium enterprise, small business, and understanding and training them on how to use the applications in business. I mean there are, you know, a lot of small business that were told: You get a computer,

you get connected to the Internet, and it's going to solve your problems. They have it, and it sits on a desk someplace or in a closet. They may have a website; it's not even been updated. And so it's really integrating, again, the use of computers and ICT, integrating them into business processes.

And also small business working with large business is part of supply chain. Working with, you know, vendors for, you know, their customers, I mean it's creating that kind of an ecosystem that then leads to the issue that I think both Raul and Robert actually agreeing on, which is creating -- how do you create the dynamic that we saw with, you know, chips and software, you know, the win-tell of virtuous cycle where faster processors led to better application; the better applications required faster processors, and so you created that dynamic. How do you begin to create that?

And then, Rob, I agree, I mean there are going to be places where, you know, if we -- you

know, it will get there, but we can't afford to wait. And so it's really not so much -- there's some just gap-filling where otherwise it would not be available. Part of it is stimulating investment where it would lag, where from a social policy perspective it's unacceptable to have that lag or to have to wait, right? And that's really more of a decision about politics and policy, not technology.

But unless you get this virtuous cycle of adoption and use and then demand-driving for better broadband, that's what you need. Unless we get that cycle going -- and I think it's already started -- how do you accelerate it?

MR. EISENACH: Okay. And just coming back to the point about rural versus urban, I think where we started, if there is a case for subsidization, it has to be in rural areas which are currently unserved or very badly underserved because there is where we know the externalities are, right. The externalities are in transportation, in telecommuning, in not driving

40 miles to the Walmart.

The externalities are in education, in having a first grade -- or they are in health care. And so to the extent that there is a case for market failure and government subsidization, that case must be strongest in urban areas.

And here's one. Blair Levin said something about path dependence earlier when we were, you chatting, you know, where path dependence and the uniqueness of the U.S. Probably comes into play more than international lessons. But we have a policy in this country which gives extremely rich subsidies to about two-thirds of the companies, to two-thirds of rural lines, and gives essentially zero subsidies to the other third of rural lines. It's called the parent trap: We subsidize RLACs; we don't subsidize larger companies or that serve rural areas, and we don't subsidize those lines even when they are spun off to smaller companies.

Well, if you look at DSL availability and broadband availability, generally, you will

find that almost all RLAC customers have robust broadband because we've been paying them $20 or $30 bucks a month per line to upgrade their networks to do that. If you look at the RBAC service territories where zero subsidies have been applied even int he most remote areas, we have a problem. And so, you know, I'm not sure that there's anything in international precedent that tells us how to solve that problem, but I think it's obvious what to do.

MR. GIUSTI: That goes to several questions dealing with making comparisons across different countries, so let me try to combine a couple of them. Is it worthwhile to create a composite of several metrics? If so, what should the basic elements be? And should cultural factors be included?

MR. ATKINSON: Well, we do broadband in the study that I alluded to, the explaining international broadband leadership.

We do a composite measure of speed, price, and take-up. Ideally -- and it would be

wonderful if OECD had this -- the fourth component has or should be availability. And that -- a lot of ways we're having a discussion about availability, we're using take-up data, and they're not the same. So that would be a nice thing to do.

Just two points on measurement, though. I really think we should just have a rule. Maybe the strategy can come out with a rule that says we are not going to use per capita measures every again, because they really are bad. I mean Korea looks terrible on per capita because they have large household size.

I have four people in my household, and we only have one broadband connection. We don't need to pay for 4-FIOS. And so just per capita really is just fundamentally misleading.

The last point I'll make is on price per megabit. We used it, and that was one of the things we used. I think it's a somewhat misleading measure because if I double my speed, my price per megabit goes down by half. My value

doesn't really go down or up by half. I mean it's not arithmetic there, and so speed is an important component, but I think we need to really think a little bit harder about how we want to do the price per speed and get that included. It can't, in my view, just be price per speed.

Japan is not 100 times better or 50 times better than the U.S. They're better, but they're not 50 times better.

MR. GIUSTI: Tim, would you like to --

MR. KELLY: Yeah, I would, obviously, speak very much in favor of the composition indices, having been the author of several in the past myself. And, clearly, that the important elements just to have take-up, to have different measures of speed and quality, and also to have price. Price is often the part that's neglected, but I think price is actually a very good predictor of take-up.

In my presentation, I tried to emphasize some of the difficulties in using individual measures: for instance, the households versus

individuals; the price per megabit versus the price per entry level. And that's why I think it's important to have a composite index which is able to reflect the different shapes, parts of the matrix.

MS. WU: Could I ask a question?

MR. GIUSTI: Yes.

MS. WU: This questions offers an opportunity for actually us to ask the public for a greater clarification on information, because I often get asked this question whether culture affects the adoption of broadband. And this is a very difficult concept to sort of get one's head around, and my plea is that if anyone has ideas on how to look at this aspect of broadband adoption, we'd certainly appreciate advice.

I hesitate to go down the path that says because we have different cultures in the world that there is nothing that can be learned from each other because we're all so unique. I don't think that's a particularly helpful way of approaching the analysis.

On the other hand, there are some kinds of metrics which are quantitative. We've spoken about some of them today -- education and family slides, et cetera, et cetera, et cetera -- which reflect culture, and they're also qualitative information that could be useful to kind of parse out some of the relevance of this. And I would welcome input from the public on that.

MR. GIUSTI: That's a slight different --

MR. KATZ: Just one -- I would like to add one thing that I don't know whether we emphasize it, which is I'm all for the indices and the composite at the average national level, but I think that what we need to emphasize is desegregated data. We need to get to the county-level data to understand these effects.

In fact, it's only when you get -- I mean my experience when you get to the country-level data, that you can understand what is going on with the economy, what's going on with some of the social indicators. And,

unfortunately, it's hard.

I mean, I was noticing in your list, for instance, Irene, you have Spain 20 autonomous communities.

MS. WU: Mm-hmm.

MR. KATZ: And every time I do analysis on Spain, the problem is that for each autonomous community, you have like five provinces.

MS. WU: Mm-hmm.

MR. KATZ: And it's only when you start looking at the province level that you -- well, there's no data. Why could we do it for Germany? Because there's a broadband atlas that has the 1800 -- they call it "lam crisi", and the lam crisi have data between 2000 and 2007. And then you can start seeing why is it that Lehr and Marvin Sirbu could do the study for the U.S. was because they had zip code level data, still not rich because they had to use dummy variables for growth on penetration.

But we have to get to that level to understand, and that's important, because at the

end, you know, the composites are good, and maybe we can tease out some causality, but we're talking about coming with a broadband policy for these countries, therefore, we the understanding of the regional level is critical.

MR. PEPPER: And then along those lines, we actually on this year's BQS study are going to be looking at some regional.

We also have data on some globally municipal, big cities to see whether there are, you know, some differences that can be teased up that might begin, Irene, to provide that.

And then I'm hoping that we'll also be able to maybe do some breakouts on the BQS on states within the U.S.

MR. GIUSTI: This one came over the internet: No one has included cyber security or infrastructure protection as part of the review of broadband strategies. Are these factors, especially trust and resiliency, at least as important as bit and a per capita? And where does the U.S. broadband network rank on these criteria?

Anybody?

MR. DE SA: Too difficult.

MR. GIUSTI: Okay, this one is not any easier: There's a great deal of development and deployment in wireless broadband worldwide. What role will governmental standards adoption play in hindering or aiding broadband deployment for rural and remote networks? A question about government standards adoption.

MR. GIUSTI: Mm-hmm.

MR. PEPPER: Well, let me take a crack at that. It's -- I don't know whether the standard has to be a government mandated standard, but there has to be global standards. All right, you know, it's, if you look at -- if you want to be technology-neutral and let's think about wireless technologies for wireless broadband, you have to have the ability to take advantage of the manufacturing curves to get your unit costs down.

So you need something that's manufactured to a standard that you want a lot of manufacturers making it because that will help

bring the prices down through the competition. But you also want a lot of people adopting the same technology and standard, be as that also will increase your unit costs.

I, you know, the lesson learned -- and I think it's probably for a different workshop, but I think there's some very important lessons learned to have -- so flexibility and be technology-neutral in terms of wireless or standards, and we've learned some very good lessons here in the U.S. with PCS and the second generation -- first generation digital, second generation digital, second generation systems, where the FCC consciously chose to not adopt a standard but allow technology to develop.

The FCC at the time was criticized because it did not pick a standard. If the FCC had picked a standard, we would have picked the wrong one. I think we all know that now. The leading standard that was being pushed at that time in the U.S. No longer exists in the market. CDMA never would have been developed, and we would

not have had the 3-G networks rolling out globally.

So there's a tension there, but you need standards. I'm not sure it's the government that needs to pick it.

MR. DE SA: Maybe, Mr. Noh, the Korean government has a lot of experience with WiBro and with ETPAC, and trying to set Korea specific standards or international standards?

MR. NOH: Once again?

MR. DE SA: Could you talk a little bit, maybe, in Korea, the Korean government has, you know, with WiBro and with WIPI has set standards, has a lot of experience in there of international standards, less of global standards?

MR. NOH: Yes, the Korean government tries many, many technologies, and we see that for the developing countries it is more efficient to deploy the wireless, WiMax, LTD, that kind of cost-efficient, we think.

But the interesting thing is when I came to the United States two years ago, my kids

complained much about, to me, why Internet speed is so slow. Usually, they play in the lower-playing game, or they have videos, that kind of thing is their main interesting things, and user demands. So to provide that kind of a video data, we need, inevitably, go higher and higher.

And now I am a customer of the Cox cable, and I pay every $45 per month. When I was in Korea, I used about 10 mega BPS, about $30. So it's the way we should go, and we wisely combinate [sic] those kind of considering the demographics and geographics. So, as you know, that Korea is quite a small country.

I would check that the size of Korea is a little bigger than Indiana state, and a little smaller than Virginia. So it is quite easy to cover almost a nine to a one on the person, comparing to United States.

So I think the United States did very well. You reach a little high, but as some expression I read from your material that now, if you go to the more high-band reach, or more the

penetration late, so just suppose 90 or 95, and average it 10 mega BPS, market forces alone may not guarantee that object. This is why the government has to intervene and initiate. So, and in the aspect of a technologies, we have to consider the demographics and geographies and that kind of a thing.

MS. WU: I just have quick response to the question that passed earlier on security and privacy, and just to link those issues to what we're doing here today, that the material that Professor Katz mentioned about why people don't adopt broadband when it's available to them. Hidden in some of those questions as some of those responses is insecurity or a lack of confidence about the use of the Internet, the privacy concerns, security concerns.

So that's the link, and we don't have time to address it today, but it's there.

MR. GIUSTI: Great. Well, as Irene mentioned, you know, the time today, we actually have hit our closing time.

Certainly, today is just the beginning of a discussion. We will have -- we will continue to be looking at these issues as we move towards the development of our national broadband plan, these and many other issues.

I want to thank each of the panelists for traveling here, for coming here today and giving us their perspectives.

I want to thank the audience who came here on a hot August day, and I think we have a pretty good capacity, and anyone who participated on the Internet as well. So on behalf of Paul de Sa and myself, thank you all very much, and we will look forward to continue to hear from you for the next several months.

Thank you.

(Applause)

(Whereupon, the PROCEEDINGS were adjourned.)

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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