FEDERAL COMMUNICATIONS COMMISSION

In Re Applications of:	)
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EN BANC HEARING ON	)
SPECTRUM POLICY	)

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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Federal Communications
Commission
Room 856
1919 M Street, N.W.
Washington, D.C.

Wednesday,
March 5, 1996

The parties met, pursuant to the Public Notice at 8:45 a.m.

BEFORE: REED E. HUNDT
Chairman

I N D E X

WITNESSES:	DIRECT	CROSS	REDIRECT	RECROSS	VOIR DIRE
None.					

E X H I B I T S

	IDENTIFIED	RECEIVED	REJECTED
None.			

Hearing Began: 8:45 a.m. Hearing Ended: 4:49 p.m.
Recess Began: 12:24 p.m. Recess ended: 1:38 p.m.

P R O C E E D I N G S

CHAIRMAN HUNDT: I will call this En Banc hearing together and I want to commence by thanking the Spectrum Coordinating Committee whose co-chairs are Bruce France and Don Gibbs for the background work which was done for the Commission. I also would like to thank the panelists and all the other panelists for the very, very high quality of the presentations in writing for what I am sure will be equally high quality of the oral remarks.

The documents that have been submitted to the FCC by all of the panelists, I think represents, in the aggregate, the most sophisticated, the most thoughtful, in short, the finest work of Spectrum Management that has ever been assembled anywhere before. Such submissions are, for the twenty-first century economy, very much like the Louisiana Purchase was for the United States in the previous nineteenth century. That is to say, the future of the country is very much at stake; economic growth, radical changes in our society, will all stem from wise policies with respect to Spectrum Management.

Figuring out these wise policies is not the work of but a moment; it has always been the work of the FCC but, we need a great deal of help because the demand for Spectrum is ever increasing. The technological sophistication that one

needs to analyze these issues is ever increasing. It turns out we need economics, Tom, to think about some of these issues.

So, I want to congratulate everybody in advance. I also want to particularly acknowledge Amy Lense, Steve Sharkey and Bruce Ransom for their specific work in putting all of these panels together and I know my colleagues will not mind if I single out Commissioner Ness for the help that she has offered to all of us, individually, both in instigating the whole idea of this group, but also in a great deal of work in our offices, with our staff in making sure that we were close to these issues with all appropriate economic and social policy considerations being in place. I want to thank you, Susan, very much for that.

Commissioner Quello, unfortunately, cannot be with us today. He is alright but he is otherwise occupied and I am sorry but we have to proceed without him.

Just to briefly run over the way we will try to proceed, each of the panels will be introduced by a different Commissioner. Commissioner Chong will introduce this particular panel and then we will get directly into the questions. We will use approximately, I guess, about 15 minutes per Commissioner for Q&A, and we will do that in terms of seniority. Commissioner Barrett, Commissioner

Ness, Commissioner Chong, and myself. I am not sure exactly why that is seniority but, that is the way it has all been dictated to us.

And then after the total of one hour of Q&A involving the Commissioners and the different panelists, there will be a free-for-all discussion that will be moderated by John McLaughlin. Just a little effort at humor here. I intend to aspire to cause the free-for-all to occur by simply asking each of you what you think of the statements made by the others.

So, during the first hour, you should be alerted to the fact that you want to be listening to your colleagues on these panels so that you will be prepared when you are called on to offer comments on the statements of the others. This should keep you all engaged because I will not be telling you in advance who I will be calling on or who I will be asking you to comment on. I would like to introduce a little element of mystery into this to keep the day moving quickly.

So, those are all the introductory remarks I have. Thank you all again for the very high quality of these presentations and I will turn the forum over to Commissioner Chong.

COMMISSIONER CHONG: Thank you, Mr. Chairman. It

is my pleasure to welcome the distinguished experts on the first panel on Future Spectrum Demand. Commissioner Quello called me late last night. He has a minor family emergency; everybody is fine but he was not able to come and he asked me to take over the beginning of his panel for him, which I am happy to do.

The Commissioner did ask me to assure everyone that he will review their written testimony. He has them and he is reading them and he also wanted to express his confidence that his fellow Commissioners will illuminate his concerns with our probing questions.

The Chairman has already explained the format, so my only job is to note our Commission's interest in this very important area of our jurisdiction, formulating spectrum policy for commercial applications in the U.S. and the international forum.

Now, on this panel, we have asked them to discuss future spectrum demand generally and, more specifically, to tell us how we should rank priorities among various users, what methodologies we ought to use to select among competing demands, how does international long-range planning affect domestic allocation policy, what regulatory and technological trends are driving demand for new services, how accurately can we forecast future demand, and how can we

improve our planning processes here at the Commission in response to changing demands.

And, with this brief overview, I would like to welcome our panelists, who are taking time out of their busy day to come share their expertise with us. Because of the limited time we have, I refer the audience to the biographies of the panelists, which were submitted with their materials and which we will make part of the record of this proceeding.

I would like to take this opportunity to allow each panelist to briefly introduce yourself and which company or entity that you represent here on the panel. We will start with Mr. McCaw.

MR. MCCAW: I am Craig McCaw. I am here representing Eagle River Communications. I am basically an unemployed communications executive, freelancing. But, basically, I work in broadcasting, wireless services, wireless data, satellite services, non-geostationary, mostly; and, in general, in my past, have been a cable television operator as well as broadcast or commentary, and, I think, nearly anything the Commission generally regulates.

COMMISSIONER CHONG: Mr. Parlow?

MR. PARLOW: Yes. I am Dick Parlow, and I am the Associate Administrator for the Office of Spectrum

Management at NTIA. I deal with all of the federal agencies in terms of their needs for spectrum; have detailed workings with the Commission on a whole host of issues dealing from our domestic types of activities as well as the international activities. I am very active in the ITU in terms of international conferences; spent some time with Commissioner Ness in some work in '95 and a whole host of other individuals that are behind me and maybe next to me and, in fact, right on my right. So, it is a very interesting topic that we are dealing with this morning, and I am looking forward to hearing what people have to say.

COMMISSIONER CHONG: Mr. Twyver?

MR. TWYVER: I am David Twyver with Northern Telecomm. We are a large equipment supplier, global equipment supplier with most of our business in the U.S. I am responsible at Northern Telecomm for our cellular PCS and wireless access businesses around the world.

COMMISSIONER CHONG: Mr. Verveer?

MR. VERVEER: I am Phil Verveer. I am here today as the chair of the Public Safety Wireless Advisory Committee, a committee chartered by the FCC and NTIA to look into future spectrum needs for the public safety community.

COMMISSIONER CHONG: Mr. Claudy?

MR. CLAUDY: I am Lynn Claudy. I am Senior Vice

President of Science and Technology at the National Association of Broadcasters. NAB is the trade association that represents commercial radio and television stations and networks, and the Science and Technology Department specifically deals with technical matters that affect radio and television.

COMMISSIONER CHONG: Mr. Murray?

MR. MURRAY: I am Peter Murray. I work for Ericcson, but today I am representing UTAM and WINFORUM, both of which are the unlicensed representatives. I would just like to take a quick opportunity to thank the FCC for creating Part 15D. Thank you.

COMMISSIONER CHONG: Ms. Mayer?

MS. MAYER: I am Susan Mayer, and at MCI, I am responsible for Corporate Strategy Development and Mergers and Acquisitions and, most recently, have had the role of champion for our venture in DBS.

COMMISSIONER CHONG: Mr. Hazlett?

MR. HAZLETT: I am Tom Hazlett. I am an economist at the University of California at Davis, this year visiting the American Enterprise Institute. I formerly worked a at bit at the Federal Communications Commission, where Robert Pepper explained to me all the issues and told me what to think about them.

COMMISSIONER CHONG: That is why we have Dr. Pepper. Commissioner Barrett will kick off the questioning.

COMMISSIONER BARRETT: Thank you very much, Commissioner Chong. Mr. McCaw, you have a sense of history, notwithstanding your unemployment status presently, at a level I would like to be unemployed also. (Laughter.) I would share some of that money with the Chairman, not that he needs it.

But given your sense of history of our process, -- and you certainly have been a major participant -- give me a sense of where you think we could improve our process for the future and how you see us interacting with the Congress and what we have done wrong.

MR. MCCAW: Well, I would have to say if I am a customer of the Commission's service, in a sense, I would say I am very happy with the direction the Commission has taken.

Historically, there were times you could remember that an AM radio station might have been a contested license, for instance, in Pasadena, California. After 15 years, the license was not worth what the applicants, any one of them, had put in legal fees because in the course of the argument over it, the technology became virtually worthless as a result of FM. So, I think the Commission has come a very

long way in providing speedy response to applications, allocating new spectrum, freeing spectrum, creating flexibility, and so I do not think there is a lot to complain about.

Historically, there was a problem, I think, with not only the timeliness, but, you know, I certainly would say the lottery process drove a lot of speculation that ended up with customers getting a lesser grade of service and delayed service later. And what became a quick way of speeding up the comparative process did not work very well, although it had a point in time. I was probably concerned about the pioneers preference process that drove people to make wild and exaggerated claims in the hope that they would get something for free with no intention of building what it was that they originally applied for.

But, in general, I think the Commission direction for the past several years has been phenomenally focused in the good of the consumer and the industry.

COMMISSIONER BARRETT: Okay. Would you elaborate just a bit on what you just said about the pioneer preference? You are not suggesting that all of the people that sought pioneer preference were not going to built out, are you?

MR. MCCAW: No.

COMMISSIONER BARRETT: Okay.

MR. MCCAW: After a while, though, anybody with a crazy idea who saw that maybe he could get something for free, he or she, did tend to go forth that way. I think the Commission did an excellent job of stabilizing the process and bringing it to a very productive conclusion that, frankly, made a lot of sense.

COMMISSIONER BARRETT: Okay. Thank you very much. Phil, how are you?

MR. VERVEER: Very good, thank you.

COMMISSIONER BARRETT: In page two of your testimony, you suggest that wireless communication, instead of increasing public safety effectiveness, may actually limit it. How do we rectify that? Would you elaborate on that, first of all; and, how do you rectify that kind of situation?

MR. VERVEER: Commissioner, the point I was trying to make is that the present shortages, particularly in major metropolitan areas, turn out to be a rather serious problem for many participants in the public safety community, and there is a kind of a dynamic here that is a significant one.

More spectrum generally corresponds with improved and increased uses, new uses, and so, what might appear at any given moment to be a sufficient amount of spectrum for

public safety needs very often finds that new opportunities overtake the amount of spectrum that we have. Now, I do not know that we have a solution for that; it is simply an observation that the public safety community is in need of additional spectrum, certainly in the major metropolitan areas and that in trying to gauge how much additional spectrum is required, we need to bear in mind that a lot of the new uses, the potential uses that we believe are going to be available over the next 15 years are going to require yet more. And that is true, even though the amount of throughput per unit of spectrum may improve dramatically.

COMMISSIONER BARRETT: Could you rectify it possibly by a more effective use of the present spectrum?

MR. VERVEER: Well, I think there is little doubt that technology provides opportunities for increased throughput, but the spectrum presently available to the public safety community tends to be segmented, non-contiguous, and there may well be advantages in terms of trying to get larger blocks of spectrum available for public safety uses that are -- to take one simple example, potential contiguous-to-commercial uses that might permit manufacturers to develop manufacturing economies that would be available to the public safety community.

So, part of the issue, I think, from our

perspective, is we are going to need more, and part of it is where it is. And if we can figure out how to do it, we also, I think, believe that it is not only where it is, but that the more of it that is contiguous, the happier we are likely to be with the end result.

COMMISSIONER BARRETT: Mr. Parlow, you obviously have served magnificently in your role. Do you share that view, that it will make it less effective?

MR. PARLOW: Well, I think that, Commissioner, Phil certainly has given, I think, a reasonable answer. Certainly, spectrum, I think, is key to delivering many, many of the new services which are needed in the public safety community.

I also believe that it is important to have contiguous spectrum not only for the use of -- across the board of the public safety community because our public safety community reaches across not only state and local, but there is a federal element. And law enforcement is law enforcement, and we must all cooperate together; we must all have intercommunications so that we can work together.

So, therefore, it is important that the way the spectrum is divided, the way the spectrum is laid out, that it is important so that we can, in fact, have interoperability, we can provide a host of services across

the board, and, certainly, in the major metropolitan areas, that is where the pressure is going to be coming from; and wireless applications breeds new types of services; new technology breeds new types of services, which then takes you to the step, it just creates a greater shortage.

So, I think we have to look very carefully at the services, the spectrum that is available, how it is laid out, how much of it, how is it contiguous and how does it serve the across-the-board public safety community, the federal, the state and the local. And I think that is what the Advisory Committee is going after, and I think it is the best route to take to find answers to those very, very important questions.

COMMISSIONER BARRETT: Tom, how do you respond to Phil's testimony on page two of his testimony about the lack of the effectiveness?

MR. HAZLETT: Well, you know my reaction in this area, as many others, is that the word "competition" and lower prices for customers seems to be sort of the last consideration. I think that there will be tremendous payoffs to public safety and many other so-called public interest outputs if there were greater competition and lower prices for customers. Think of the public safety payoff of having wireless telephones, cheap and ubiquitous, so that

everybody on the street had a cell phone or had a wireless phone.

I mean, prices are too high; more competition is going to bring prices down. We have seen that that is already happening in some of the markets where you get the additional competitive entrant and, I do not think there is any incompatibility with market allocation, either through auctions of the licenses or further liberalization, flexibility for the licensees themselves.

In fact, I would think that many innovative uses of wireless would come about if you allowed more competitive service providers to exist with flexibility so that they are going to the public service community and the public safety community and saying, "Hey, we've got a great new service for you. Come on board. It's cheap, and we're going to make the service better."

COMMISSIONER BARRETT: Susan, I asked Craig at opening, in terms of what we can do better, and given the fact that you all have had a medium-sized investment in this arena, how can we do things better in terms of the business community and make it less cumbersome for entrepreneurs, if I may, or people who can provide additional services?

MS. MAYER: Commissioner, one of things that makes it, particularly in our specific case, made it easier for us

to accomplish our business was the speed at which the Commission moved to reallocate the spectrum once it had taken it back and the speed with which the auction process itself was set up and implemented. And I think that the ability as technologies change, as demand changes in the marketplace, as new applications are developed, either by technologies or by business entrepreneurs, the ability to reallocate spectrum, take back spectrum where necessary, processes for the reallocation of that spectrum being done in a flexible and a rapid manner will make it easier for the business community to achieve their objectives.

COMMISSIONER BARRETT: Okay. Mr. Chairman, I do not have any more questions at this time. Thank you, very much. And much of what we have talked about, in terms of reallocation, is due the Chairman. Thank you, very much.

CHAIRMAN HUNDT: Commissioner Ness?

COMMISSIONER NESS: Thank you, Mr. Chairman. First, I just wanted to say how delighted I am that we are gathered here today. Certainly, spectrum represents one of our most valuable resources in the American public, and at a time of such rapid change, rapid technological change, new opportunities brought forth by virtue of passage of the Telecommunications Act of 1996, where we are going to see more convergence, and an effort certainly that I think

everyone is aware of outside of the Commission as well inside the Commission for us to revisit all of our roles, to revisit all of our policies with a new way of looking at them to see whether they are timely in today's marketplace.

Given all of that going on, for me personally, and, I think, for the Commissioners as a group, it is extremely helpful to have your input today to look at the issue of spectrum management on a global perspective: How the pieces of the puzzle fit together, what the considerations ought to be, how we ought to proceed as we look at individual dockets down the line. And so I want to thank everybody for being here today, thank my fellow Commissioners for all of their hard work and thoughts in this area as we grapple with these exciting questions as how to we can best serve the American public.

I did want to begin by asking everyone if you could just give me, each of you, the two or three predictions that you see for the future demand for spectrum. What are we looking at down the pike, if you brought your crystal balls with you, beginning with Craig McCaw, please?

MR. MCCAW: Well, if you allow me to start with the nature of humanity and why we probably have always underestimated the need for spectrum is that I think humanity, by nature, is nomadic. And if we remember back

that one of the things I have said is that it was the discovery of the value of seeds that drove people to stay in one place and tend crops. And once they were there, then they needed protection, and pretty soon, the person who was protecting them, by their association, was dominating them.

And I think humanity hit a low point in the industrial revolution when children were used as if they were tools or machines and consumed in that way, and it was mobility and information that began to bring humanity out of this. And, if we presume that people, if they are given their freedom, aside from economics and all the issues of housing, clothing, safety, would be nomadic to a degree far greater than they are today in every part of their daily life, then in supporting that, with both the computing and telecommunications needs, you can foresee a huge demand to support the human being, as it were, as the center of their universe traveling around and no longer relying on central infrastructure in a corporation or government or whatever.

And, therefore, I think it is reasonable to presume that people will locate themselves physically in places further from metropolitan centers, and they will move more during the course of a year, and, therefore, they will take with them devices to bring large amounts of information as well as handle those daily needs.

So, my presumption is, as we give people the tool, much as when we build a freeway, -- and the car, of course, was an early transportation freedom device with a lot of concomitant, difficult problems -- pollution and crowding, etc. -- that spectrum does not have, but you build a highway, you see what people do, essentially create cities and all kinds of repercussions that we never foresaw. And so I think we are seeing with the allocation of spectrum. I think with the new PCS spectrum under auction and previously auctioned, you are going to see behavioral changes related to our fundamental nature. So, we will use it up faster than we expect.

COMMISSIONER NESS: But in terms of your expected uses, you point to the mobility of society and the desire to have information directly wherever you happen to be. Therefore, your conclusion is a lot of use for mobile services in the future as opposed to wired services or fixed services.

MR. MCCAW: Well, I think we have an insatiable demand for information. But, clearly, as we have seen even with the battle between direct broadcast satellite and cable television as well as broadcasters, as the Commission eased the duopoly rules and allowed television broadcasters to speak more effectively with cable as DBS came along, it

turns out people will take choices for reasons that we would not have expected and that the wired/wireless process is not wired for video and unwired for audio purely, but it will be a mix, and we are going to find it much different than many of the predictions.

COMMISSIONER NESS: Before I call on you, Dick, I also just want to recognize Vena Rowat, who is in the audience, who had been or is one of the chief engineers, if not chief engineer, for the Canadian delegation at WRC this past fall, and she did an excellent job on behalf of the Canadian Government. She is visiting with us this morning, and I just wanted to recognize her and thank her and the Canadian Government for their activities at the work. We worked very well together, and it was a great pleasure to get to know her. Vena, thank you.

I am sorry. Dick, go ahead.

MR. PARLOW: Thank you, Commissioner Ness. Well, in my paper, which unfortunately came a little bit late because I just got back into the office yesterday after spending three weeks in Geneva dealing with some very interesting ITU matters, one of the sections in my paper I have identified what I consider to be an overview of basic spectrum needs, which I think gives some insight into where I would be coming from in terms of what we have to look

forward to.

One of the areas that has already been mentioned is certainly public safety. That is an area that we must -- well, first of all, going back, mobility is an issue that I think involves almost all of the services today. It is important, and Craig has mentioned that, so I will not go any further. But it is a key to the way I think we have to look at telecommunications development and future spectrum needs. So, from looking at it from that standpoint and looking at a whole host of issues, I would say that law enforcement and public safety, that is an area that must and has to be met in the future.

One area that was identified at our conference in Work '95, was the need for wireless local loop. I think that is an area that is coming into concern. It is an area that we must take a look at. It is on the agenda for Work '95; so I think as we prepare for that conference, we have to look at that; that is an area that must be addressed.

The mobility satellites; certainly one has to look at the continuing needs of the Big Leos and, more specifically, the Little Leos. I think we are all very much aware of the fact that that is a contentious -- not contentious issue, but a very difficult issue that must really be dealt with.

An area which is of interest -- and I think it works

its way through a whole host of areas, and that is a trend towards satellite-based, air traffic control. That is an area that is close to my heart in terms of what is the future air traffic control system going to look like and what are the spectrum needs for that new system? What changes will take place? What spectrum can be refined? Will we have redundant systems and coverage? Some very interesting topics and interesting issues that have to be addressed. If you want to cut me off as I go along, just let me know.

COMMISSIONER CHONG: I think -- yeah, I think that gives us three of the key areas. If there is one more that you would cite.

MR. PARLOW: Well, one last one, -- and I think that we all have to recognize -- and it falls into my domain -- and this is the subject of national security. In the national security area, I think we will find as time goes on that there is a continuing need for consideration of the national security needs because as we look at the world the way it is today, force enhancement is only going to be achieved through the use of telecommunications and command-and-control systems which really make use of spectrum, and that is an area that we cannot lose track of as we go through the process of meeting our commercial needs. There

has to be a blend between those types of activities.

COMMISSIONER NESS: Mr. Twyver?

MR. TWYVER: I defer to Mr. Parlow on the national security needs. On the commercial side, I think that what we call mobile voice and mobile data will continue to dominate the -- we call it mobile; it is not necessarily mobile. A lot of the times when we use our mobile phones, we are actually standing still, sitting in airports or sitting on street corners or whatever. It is really communication where they are on the wires, and we expect that that kind of wireless communication for voice will continue to grow at the current pace, and we can see it getting to fifty percent penetration in the next few years.

Increasing faster will be data applications using wireless for both transactions of particular applications and general access information, Internet kinds of access and so on. But I think the highest growth area globally and, increasingly, in North America, will be wireless local loops, especially with the new Telecommunications Act. The easiest way for alternate-access providers to get into facilities-based competition is with radio. It is already happening widely elsewhere. The technologies are now available. The cost of providing a wireless local loop crossed the cost of providing a wired local loop last year.

It will continue to go down by about ten percent per year, while the cost of wires, we expect, will continue to go up by over ten percent per year.

So I think the largest new need for spectrum in the U.S. will be for wireless local loop and wireless access applications.

MR. VERVEER: It seems to me that there are several things that are easily predictable from the perspective of the public safety community. One, more spectrum is going to be required. Two, it is going to be used more efficiently. I think that is just inevitable. The Commission's initiatives with respect to flexible uses of spectrum are things that should be applied across the board. Applying that to the public safety community is going to yield dividends. A related point, the strengthening of the quasi-property rights associated with spectrum, also helps to assure that.

In addition, as Tom said, commercial activities are going to matter, and they are going to matter a lot. They are going to matter for at least two reasons. One is that it is conceivable, with additional competition in wireless services, that some commercial vendors will, in fact, find applications that are attractive to the public safety community. And, secondly, in terms of pushing the state of

the art, some of what the commercial service suppliers are doing and, of course, their manufacturing vendors, will translate into very useful innovations for the public safety community.

Last, however, when it comes to public safety, fiscal constraints are going to continue to apply. And that has very significant implications when we begin to talk about making spectrum available for auction. And, unfortunately, notwithstanding all the progress on the use of spectrum site, it seems to me that the public safety agencies, by and large, are going to continue to confront very profound fiscal limitations in terms of their ability to acquire the new technologies and implement them.

COMMISSIONER NESS: Lynn Claudy?

MR. CLAUDY: Generally, the demand for video services are growing very fast, that includes things outside the traditional terrestrial broadcasting realm. You can look at the DBS services, the wireless cable, or the telephone company entry in cable, and these are services that are all exploding today, and they all need spectrum, either for direct delivery to consumers or for auxiliary special needs for infrastructure. And video is an extremely important service to look at when talking about spectrum because it needs so much of it every time you do it. The

channels of terrestrial television are six-megahertz wide for one program, and when you compare that to the few tens of kilohertz or hundreds of kilohertz for audio channels, you see the video is a real spectrum vacuum cleaner.

Advanced television is coming and, of course, that will be taken out of the existing VHF/UHF allocation, so there is no increased demand there. But for broadcasting, auxiliary services are a particular concern. There is a 1993 study from Mr. Parlow's organization which shows the expected growth of demand in auxiliary services to be almost 15 percent the annual rate of growth in broadcasters' use of the two-gigahertz band; documented that from 1989 to 1993 and projected 15 percent annual growth for the next five years.

So, if that spectrum is reallocated, either in small or in large part, it is essential that there is replacement spectrum to be found to meet both the current and future electronic news gathering and other auxiliary needs. And his study is consistent with other studies that have been done. NAB did a study of frequency coordinators in 1995, and a hundred percent of those all said that two gigahertz is congested, and the other bands have similar problems.

COMMISSIONER NESS: Okay, thank you. Mr. Murray?

MR. MURRAY: Thank you, Commissioner Ness. I am

looking at it somewhat differently. I am listening to what has been said, but representing the UTAM/WINFORUM, which is the unlicensed group, what we are doing is looking to share spectrum, not have dedicated spectrum for this use or for that use; it is to share the spectrum, which is why I thanked you for Part 15(d), and we would like to go further in that.

When I look down the pike for new technologies, I might actually look backwards a little bit, because it is our children who are the computer literate people who are becoming more computer literate. If you want to find a phone at home, you find where your child is because that is where they have left the analog phone. So they are used to communications; they are used to instant communications; they are growing.

People who use cellular phones and mobile phones and such like that are very often -- and this is not a criticism, because this is how business works -- the bill is paid by the company, whereas in unlicensed spectrum, a lot of this is paid by the individual. So having spectrum that will allow the individual who wants to pay low cost for the equipment but good transmission of data and voice is, of course, something that is going grow and grow as more and more children get more and more literate.

Companies who have outfitted schools with computers have done it in the past with wireless. There was an article last week about the cost -- I am sorry -- with wires -- an article last week on TV about the cost of putting those wires in and how local communities are getting parents to put in their own sweat equity to put the systems in. WINFORUM has got before the Commission today a request to Supernet for spectrum. Apple has got a request to the Commission also for spectrum, and both of those groups are working very closely together and I believe have come to a consensus they would like the FCC to put out an NPRM so that they can go ahead.

But we are talking about future spectrum for the Supernet -- upward of five gig. It is not just going to be data where you can use it in schools and hospitals and places where getting licenses or being constrained by high cost is something that is not easy to do because they want to keep the cost down. Voice, mobility -- I agree with Craig that one of the things is that when I use my cordless phone at work, it is just in my belt and wherever I am, I use it. When I am on the road, I use the wide area, but for the unlicensed, the low power, frequency reuse, frequency sharing. So the three things are increased use of voice, data, and, as we just said, the multimedia for data, where

it is not just going to be the data transmission; voice is also going to include the video side of it.

COMMISSIONER NESS: Ms. Mayer?

MS. MAYER: There is a wonderful story about AT&T back in the 1970's predicting what the demand for wireless mobility services was going to be, and they thought there were going to be about a million users of wireless mobility services by the year 2000. And even a couple of years ago, when people prognosticated on how big the demand was going to be for mobility services, they were talking about 60 or 70 million; and, as we know, the most recent prognosticators are talking about something in the 100 million subscriber range by the year 2000.

I think, with all due respect to all of us, it is terribly difficult to predict exactly what the demand for services and, therefore, the demand for spectrum is going to be even five years out. Having said that, however, I think most of the trends that people have talked about up until now are the right trends. Clearly, we have taken the lid off the can on mobility. We have taken the lid off the can of demand for information services. That requires more spectrum, and it requires higher bandwidth than what is available today. And I would also agree that wireless local loop is going to be a big user of spectrum as competition

increases in the broad telecom arena.

COMMISSIONER NESS: Tom Hazlett?

MR. HAZLETT: I would be tempted to give the B-plus answer, which is that if we just extrapolate the current trend, which economists love to do, for some period of time into the future, mobility is going to be a big driver, but also local-access competition, including high-speed Internet, will likely be important, as well as video services, where there is woefully little competition and, obviously, a pent-up demand for more. But, I think the A-plus answer to this question is "I don't know."

There simply is no substitute for trial and error in the marketplace. It is extremely dynamic out there. It is so dynamic that people are getting lost all the time; there is even a trade association in Washington called the Wireless Cable Association. Oxymorons are flying around faster than people can sort out the words that compose them. And I think that, in answering this question, the Commission might look to see what it has done successfully in the recent past, and I would like to point out the successes of the PCS allocation in departing from past Commission in bottling up new competition.

And I should say that I served on the PCS working group up until July 1992, and then I got off the working group,

and they recovered quickly; and I think, in many respects here, the lessons are clear. The difference of the PCS allocation was that there was tremendous flexibility in many respects. First, the Commission decided to, in essence, let the market decide the size of franchises. It did not impose franchise sizes and that was accomplished through the use of simultaneous auctions.

Secondly, it let the market mostly determine the service, via a very broad license definition for what the services could be. And I should say that I heard a speech by the Chairman just a few days ago where he noted that some of the PCS licensees are now talking to computer companies for modem access, wireless modem access, and so forth, uses that were not on the agenda, if you would have asked this question a few years ago, for PCS services. But, in a competitive environment, with a broad service definition, they are stepping up to the plate and creating the innovation that we want to see out in the marketplace.

We did not define the technology, obviously, that the companies are using. They are free to experiment and to use the kind of systems that they think will work and that get shaken out through trial and error. We did not dictate which incumbent stayed and which incumbents went, and there are negotiations going on right now to use the spectrum in

the most efficient way according to voluntary reallocation. And, finally, we let the market determine who the operators would be through a licensed auction.

And I think all of these elements of flexibility allowed us to put the PCS allocation out years faster than what it would otherwise be, to bring competition to wireless, to get this mobility out there quickly, and to see the new services that innovators, given the opportunity, will bring to the marketplace.

COMMISSIONER NESS: Thank you very much. I know my time has just expired.

CHAIRMAN HUNDT: Commissioner Chong?

COMMISSIONER CHONG: Thank you, Mr. Chairman. Now, let us get some debate going here. I do not mind if other Commissioners feel like jumping in in my section for a followup question. I have my notes. I have Mr. Twyver and Mr. Hazlett down as "Mr. Market Forces," and then I have the public safety guys, Mr. Verveer, and Mr. Parlow has concerns about national security issues and air traffic control; and I want to throw it out to say if market forces control and, I think Twyver says auctions are always appropriate, then how do we take care of needs for public interest uses such as national security, public safety, air traffic control, national security, things like that. Who wants to start?

MR. HAZLETT: I would be happy to start. In Ms. Mayer's testimony, she outlined the fact that the default rules should be competition and flexibility and that there are exceptions are to that rule and those are taken care of explicitly in some other proceeding. I hasten to add that the fact is that competition is continually underplayed as a contributor, however, to these public interest outputs, and there certainly are tremendous payoffs in all these areas, from enhanced competition to lower prices to the customer, as well as innovative uses for spectrum that cannot be preordained or preplanned and need that flexibility and trial and error.

COMMISSIONER CHONG: Sir, are you suggesting that commercial applications ought to donate for public safety uses, or should we, as a commission, make choices that certain public-interest uses are appropriate and withdraw that spectrum from what we would auctioning?

MR. HAZLETT: Well, the most flexible design would be to go ahead and let the competitive forces allocate the bands in very flexible manners and to directly fund whatever public service outputs were deemed insufficient in that market allocation. That is the first best. The second best would certainly be to reserve certain bands particularly for those uses.

COMMISSIONER CHONG: Who would decide which uses would be funded and at what level? Is that a government entity or are you going to rely on the --

MR. HAZLETT: Well, it certainly would be the Commission or the Commission recommending to Congress for direct subsidy of particular services.

COMMISSIONER CHONG: Mr. Verveer eloquently spoke about the financial constraints that the public safety groups suffer. What about them? Should there be a discount? Should we just give it to them free?

MR. HAZLETT: Well, I mean, that is a Commission decision based upon what the political constraints are. The point is, if the decision is made to give licenses free to those public service elements, that does not mean that the commercial uses have to be stifled while inflexible and rigid planning takes place across the rest of the spectrum.

MR. TWYVER: There is another angle here, Commissioner, I think, that we spoke about earlier, and that is the fact that many of these public safety uses can make use of either commercial equipment or commercial service, and especially with the new digital technologies where privacy is assured and where priority in calling can be enabled, many of the uses that public safety agencies put the spectrum to can actually be served by commercial

providers. Similarly, if we can arrange to have public safety spectrum adjacent to or similar to commercial spectrum, then the costs of the equipment that they will have to provide ought to be reduced by virtue of the fact they can piggyback on the commercial business.

COMMISSIONER CHONG: How do we achieve the latter other than allocating the spectrum next to it? Don't we have to get manufacturers involved, and we have to have some kind of coordination process between all the state, federal, and local agencies in order to accomplish this interoperability issue?

MR. TWYVER: It is difficult to do retroactively, but if new spectrum is being contemplated for these uses and new spectrum is being contemplated for commercial uses, it might be able to be allocated adjacent.

COMMISSIONER CHONG: What do you think of that, Phil? Would that work?

MR. VERVEER: Yes. I think that is actually pretty close to an optimal result. If we are able to find spectrum that is available for public safety uses that is adjacent to what we think of today, at least, as comparable uses in the commercial world or, conceivably, certain governmental uses, federal government uses, that would be a pretty happy result.

I want to go back, just for a moment, to what Tom was saying because it seems to me his answer is, of course, exactly correct. If we could rely upon the market, we would; but we know that markets fail sometimes and one of the causes of market failure is the existence of significant externalities, and that probably is a pretty good definition of public safety activity.

So, we are in a world of the second best, and I do not know of any way, other than to have a governmental decision, to have the Commission decide that a certain amount of spectrum is going to be set aside for these uses. It cannot help but be an estimate, of course, and it cannot help but be somewhat less precise for the lack of price signals. But I think, in the final analysis, that is about the only way that this can be done.

COMMISSIONER CHONG: Mr. McCaw?

MR. MCCAW: Yes, I think -- and I would agree with Phil that a certain amount of spectrum is important -- what I think we have found in most of the disasters that have befallen the country in the last five to ten years is that wireless ended up, commercial wireless ended up being the significant player to assist the forces trying to right the situation. And a couple reasons why that occurs, I think, is, one, the commercial networks can afford to build and

provide services that, spread upon relatively intermittent demand in the public sector, could not be done.

And I think one thing you see is that cellular is now so ubiquitous, -- and by the way, I compete with cellular now; I am not speaking on my own behalf -- cellular is now so ubiquitous, and as you add new services like location services, you can conceive of a police officer just able to push a button on a phone, and as long as there is priority access, which has now been granted to the government, he could push something if an officer needs help with an exact location.

It could turn out that the cheapest and best way relative to the use is to use a service like that, using virtually no bandwidth and technological innovations paid for by the private sector working to the benefit of the public sector. And the more we can do that, the better we will be. Clearly, it does not take away the need for some dedicated systems, but I think some partnership should be worked between the industries to see if we cannot do more of that, which will accomplish all of the goals, both pro-competition and lower prices for public safety.

COMMISSIONER CHONG: Mr. Parlow.

MR. PARLOW: Thank you. I think Phil has made some very good points with regards to availability of

spectrum and having it be contiguous or close by to commercial types of spectrum, because many of the equipments, for example, today that are in operation are very similar between what the federal, state, and local people use and that is used commercially. The equipment is similar, to a certain extent. But I think it also important to recognize that there is a day-to-day function that has to be maintained and so there is a need, I think, for spectrum and capabilities which are dedicated to the public safety community. Certainly, augmentation through the use of other types of services is something that has to be addressed, and I would expect that within the Advisory Committee, those types of things will be looked at.

Any type of action with regards to spectrum for the public safety community and the ultimate sort of configuration to serve those needs as an effort that certainly is a cooperative effort between the NTIA and the FCC in terms of any action that is taking place because we do have a very direct, mutually supportive interests that have to be taken care of, and I think we have to recognize that and that has to be a basic underpinning for this type of activity.

And I think that was the reason that we all collectively put together the Advisory Committee, to make

sure that we do have the user community on both sides available to provide the input so that we can then find the best mix and the best combination of spectrum capabilities and how you can perhaps use and augment the existing systems or new systems with commercial types of services.

So it is a very interesting task, a very interesting problem. The solutions, I think, are still in the pipeline.

COMMISSIONER CHONG: I have one last question. Mr. McCaw, you suggested that the Commission should reserve spectrum for the future to ensure availability for continuing innovations. What is the advantage of this kind of proposal to reserve, and how much do you think we should reserve? And after you respond, I would like to know if anyone else thinks this is a good or a bad idea.

MR. MCCAW: Well, in a sense, there is an automatic reserve that the Commission has had that, over time, technologically we are able to use higher and higher frequencies. It has not been that long since we thought AM radio was the ideal way to go, and that is probably the closest we will see to people giving back licenses to the Commission and saying, "Thanks, but I don't need it anymore."

So there is a natural reserve in that process that we are beginning to tap anyway. But in the auctioning process

which, of course, I support very much, as you bring on orderly competition, the efficiency of new services gets better each year, and to the extent you auction spectrum in an orderly manner, you will allow the new, better services to continue to occupy the spectrum. And, in a sense, it is a process that is, by its nature, almost occurring today, if you look at the rate of the auctioning process and the rate at which services will start to come on and you will have a delay to that between the auction period and the commercial service. But now that we are going to see those, I think we are going to see that there is going to be a dramatic change in pricing in wireless services as a result of the actions you have already taken.

So long as the auctioning process continues in an orderly manner, I think you have got the mechanism, as it were, the reserve in place.

COMMISSIONER CHONG: Isn't it true, though, that not all spectrum is equal? I mean, there is kind of beachfront spectrum, and there is other spectrum that is not quite as good for all different types of uses?

MR. MCCAW: I think that is true. What we are finding, though, is, for instance, the new PCS spectrum is coming on line, even though it is less valuable technically, the handsets and equipment are being priced on a forward-

looking basis very competitively with the 800 megahertz, very much, therefore, covering up that relative lack of value or the value differential.

There is better spectrum, clearly, and I think we will find optimum uses for different spectrum, but the beauty is that the new spectrum, your needs like wireless local loop, happen to occur in the very spectrum where we have less efficient today and the Commission will be reallocating and auctioning.

COMMISSIONER CHONG: Any responses? Ms. Mayer?

MS. MAYER: I am not sure how much spectrum actually needs to be reserved for new applications. I would suggest that the market dynamics or competitive dynamics will decide what services ought to be provided on what spectrum, with perhaps some spectrum being reserved for things like we talked about in the last question, for public safety and other types of national interest. But in the broad commercial spectrum, I think you will continue to see not only Craig's example of analog radio but, for example, when we were talking about analog-to-digital TV conversion, if digital TV is really a better use of spectrum and consumers will want to buy the services afforded by digital TV, then the spectrum that is currently occupied by analog TV will be available at some point in the future for new

applications. And I think as technologies change and as demand changes, and applications improve, spectrum that was previously used for something else will become available for use either by the existing owners of it for new products and services or it will be turned back and available for other people to use it for different products and services.

COMMISSIONER CHONG: Tom? And then I will give it back to the Chairman.

MR. HAZLETT: Yes. I would just like to say that I strongly disagree with the concept of spectrum reserve. A spectrum is a wonderful natural resource, a non-depletable natural resource, and the only way you can waste it is not to use it. The unfortunate result of some policies have historically been to keep potential competitors out of spectrum that could be used for public benefit, and I think that that is a great tragedy: It hurts consumers, hurts the public. The point is, make it easy to get into the spectrum and make it easy to reallocate the spectrum as changes and technology allow us to do more with any given band; and that means, low entry barriers for the newcomers and flexibility, very broad service definitions for the licenses.

COMMISSIONER CHONG: Mr. Chairman?

CHAIRMAN HUNDT: Thank you. At the risk of simplifying, I have understood Craig McCaw to say that we

are going to need, in the future, more spectrum for mobile uses, and Dick Parlow has said that we need more spectrum for national security uses, and David Twyver has said we need more spectrum for wireless local-loop uses, and Phil Verveer said we are going to need more spectrum for public safety uses, and Lynn Claudy has said we are going to need more spectrum because the demand for video over the air is growing so rapidly, and there appears to be a not-yet-satiable consumer interest in that, and Peter Murray has said that we need spectrum to be shared;, and Susan has said that these predictions may be wrong, but that all these trends, in fact, seem to be right and that these are the correct directions.

I would like to ask anyone if they could tell us how in the world the FCC is supposed to quantify these predictions. Does anyone have any idea how we could quantify these so that we would have some sense of what the gross demand -- future demand, for spectrum is?

MS. MAYER: I just do not think you are going to get it right.

CHAIRMAN HUNDT: It can't be quantified.

MS. MAYER: No. I think, directionally, you can quantify it within maybe a two- to three-year time frame what services have already been identified and what the

demand for those is going to be. But it is going to be technologies and consumers and forces in the marketplace that are ultimately going to decide what services are going to take off and how successful they are going to be.

CHAIRMAN HUNDT: Well, while it cannot be quantified, it is certainly more and more and more and more and more on the demand side. Now, does anyone on this panel have any idea of what spectrum exists that can be used for any of these demands? Does anyone know of any spectrum? Peter? Now, Dick, if you know any that is reserved for DoD, we know you cannot tell us, so I mean to exclude all national security spectrum.

MR. PARLOW: Well, we do not have a big grab bag and just pull it out. I would just like to point that, in addition to national security, there is certainly needs, as I mentioned, for public safety and certainly the unlicensed devices -- that is one of the items that I did not bring up, but I think that is one of the real growing areas.

CHAIRMAN HUNDT: Well, Dick, I give deference to all those points, and I do not disagree with any of these assertions; I agree with all of them. I am asking if anyone knows of anyplace where we are going to find the spectrum. Does anyone specifically know of any spectrum? Lynn, do you have some spectrum possibly? Of all the people to

volunteer, you were the least likely, in my mind. Go for it.

MR. CLAUDY: In terms of technology, -- and it has been brought up here before that certainly technology allows more efficient use of a given band; at least if you have a closed system where you are controlling both the transmitter and receiver, that frees up spectrum. Also, the trend for higher frequency, as Mr. McCaw pointed out, allows more spectrum to be used. And, finally, the illuminating principle that has come up recently in reallocating some of the use of federal spectrum -- not to put at risk the defense system, but there is an awful lot of federally controlled spectrum that could be put to private use, and that process has been started. So I think all those things are factors that, if they do not create more spectrum, there is no more spectrum to be made -- it is like land -- but using it more efficiently is certainly something that everyone is working on, and the Commission is doing its part.

CHAIRMAN HUNDT: This is a very good point. Let us talk about more efficient uses of spectrum, and let me do it in the following way. Lynn, do you believe that we have, as a country, issued the appropriate number of licenses for analog television? Have we issued too many, too few, or

have we got it exactly right?

MR. CLAUDY: Well, I think it has grown in proportion to the way it was allocated and the business was built up and, yes, I think it is an appropriate --

CHAIRMAN HUNDT: Did we have it exactly right as of 1980?

MR. CLAUDY: It is not a question of getting it exactly right, but, certainly, those who say we have 402 megahertz of spectrum -- and that is a gargantuan amount from television -- are not really thinking about the relative efficiency with which we are able to deliver a variety of programs to 98 percent of the population, and that is a very efficient allocation. If more were added to that allocation, would those programs be appreciated by consumers? Probably.

CHAIRMAN HUNDT: So we could have more analog TV licenses now, and it would add value to the public good of free over-the-air television. That is a fair statement, isn't it?

MR. CLAUDY: I do not think I could predict that. I only know that the market is where it is at; people are buying more services for video. Whether they need more locally based stations, it seems to be at an equilibrium.

CHAIRMAN HUNDT: Well, we seem to have people who

are willing to pay in auction for the rights to deliver video locally, -- those are called the "wireless cable auctions" -- so we do seem to have demand for over-the-air video, and I presume that people would like to get that for free since they are willing to pay subscriptions for it. In wireless cable, they would probably like to get it for free.

But my point is that in 1980, we had a certain number of analog TV licenses, and now we have it exactly right, but in 1980 we had about two-thirds the number we have now. We have granted about 50 percent more between 1980 and 1992. Did we make a mistake in doing that? Did we have an insufficient number of analog TV licenses in 1980, and now we have it exactly right? Tom, can you comment on that question, again?

MR. HAZLETT: Yes, it is in a pattern here. I think the Commission ought of look, as going to the high-definition or advanced-television allocation, I think it ought to look very carefully at the mistakes that were made in the last television allocation, the TV allocation table of 1952, and I think that was a disaster for consumers. We actually had four national networks at the time operating on experimental licenses and the DuMont Network, struggling at the time, said do not issue the licenses like this or you are going to eliminate us. That was a good prediction, and

they were gone by September of 1955. And we restricted the ability of UHF to compete, and, in fact, kept cable out of the market for a long time. Finally, cable came in through deregulation in the late-1970's, and you got more competition to VHF through cable and UHF stations finally in the 1980's. And I think the big increase, particularly in UHF stations in the 1980's, was caused by, now, the viability of UHF through cable actually making the transmission difficulties of UHF much smaller.

And if you want to ask where some spectrum is, certainly the 402 megahertz is vastly underutilized. We could deliver the television product on, you know, maybe a tenth -- the analog product on maybe a tenth of that band if we allowed great flexibility and if we allowed perhaps aggregation of licenses in bigger blocks. If you were to go to that band and, say, split up the 402 megahertz into something like eight 50-megahertz bands or blocks and auction them off, you would get a tremendous new service.

Now, you could fix rules that over-the-air television had to be provided on part of those channels or whatever you want to do in terms of the specific rules, but if you allowed flexibility through that delivery system, you would free up a massive amount of service that would go to the public, that would lower prices for Internet access or

mobile telephony or other video, multi-channel video services. All of the stuff that we have been talking about could certainly be provided if we had a much more flexible allocation there.

CHAIRMAN HUNDT: Well, Lynn said -- excuse me -- Susan said in her remarks, the following quote: "The paramount objection of the Commission's spectrum auction process is, and should remain, its ability to rapidly and efficiently grant special use rights to those who value them most highly." Is there anyone here who disagrees with that proposition?

MR. CLAUDY: I will disagree with it. We do not think that the issues that spectrum allocation should be just a money exchange process of buying of art pieces. The core function of the FCC is to safeguard the public interest here and to place that at the pinnacle of the spectrum allocation process. And it is not a perfect process, but it is the Commission's role; and, by and large, we think, like Mr. McCaw, that we are satisfied customers that, as an expert agency, the FCC has the ability to make the decisions that, on balance, are best with the public interest involved, which does not necessarily mean the highest value that someone is willing to pay for the spectrum.

CHAIRMAN HUNDT: Well, if we just zero in on this

one portion of what Susan has said, -- the rights should go to those who value them most highly -- do you agree with that? Even if they are awarded by assignment instead of by auction, shouldn't they go to those who value them most highly?

MR. CLAUDY: If in valuing them most highly they are using them for a use that is valued as opposed to speculating and that is of high value to them, I think that the vagary of the word "value" is difficult to form an answer.

CHAIRMAN HUNDT: Susan, what did you mean by the word "value," "to those who value them most highly"?

MS. MAYER: Actually, I think you did a good job of trying to figure out what I was trying to say there. In some cases, it may be a public policy issue, and the highest value may be to reserve a small portion of the spectrum for public safety or defense reasons. But beyond that, there is a very commercial interpretation that was implied there, which is, let the customers decide what services they want; let the customer tell the businesses, like those which many of us represent, that they are willing to pay for these services, and then let us decide whether we want to be in those businesses and what we are willing to pay to be in that business, which may, in some cases, include having to

buy spectrum.

CHAIRMAN HUNDT: To which group of customers would we look to get a sense of the value of free over-the-air broadcast? Tom?

MR. HAZLETT: Well, obviously, their representatives or the station owners that estimate how much advertising revenue is going to accrue in the future, and that is a very rough estimate because advertising revenues may be a little different than what some other estimate of value is to the customer, willingness to pay or some other estimate. But the way it is done now is that there is an auction; it is just in the secondary market; the government does not get the money; the broadcasters are obviously allocating licenses amongst themselves on the basis of willingness to pay for the license, meaning how much advertising revenue they forecast, the highest bidder takes it.

CHAIRMAN HUNDT: With respect to broadcast TV, don't we really have two different valuation processes, which are very difficult to reconcile? On the one hand, advertisers obviously value the assignment of the spectrum for this purpose because they are spending something like $30 billion a year to underwrite the programs that go on broadcast TV. On the other hand, the public values this

service as a public good and does not in any way pay to express its value but, clearly, we all feel that there is value. How do we reconcile these two different valuation mechanisms?

MS. MAYER: Well, I think it becomes more complicated because if in the case of free off-air TV, we nearly went to a pure auction type of process. I think there is a policy risk that the type of programming that is available could become limited or could become channeled and that the broad spectrum that is available today over the air may not be as available in the future. So, at that particular point, we try and pull together everything everybody said up until now because it comes back to what the role of the FCC is.

The FCC, in this particular role, has to be the arbiter to understand how to make those policy trade-offs, how to force those policy trade-offs between what may, on the hand, raise an enormous amount of money for the Treasury, on the other hand, may limit the access by the American public to information or to video programming of one sort or another and force those discussions and force that debate.

CHAIRMAN HUNDT: Don't you think that in trying to evaluate all of the competing demands for spectrum and recognizing that we do not have enough spectrum and none of you all have been able to identify enough spectrum to meet

these competing demands, we need to have some reliable technique for adjudging between different demands for spectrum? Don't we need some technique, some measuring stick, some benchmark, some method that is consistent?

MR. HAZLETT: Well, that is what you get with market allocation. I mean, you certainly get entrepreneurs in competitive market -- and, hopefully, it is competitive. And the Commission is very well aware of the fact that if you engage in kind of allocation policy, that there is sort of a poor man's antitrust involved with making sure there is competition in these markets through FCC allocation policies, but, from there, it is a market allocation, and it really is what works in the marketplace according to these rival bidders that are out there. So we do have a very persistent ranking mechanism in terms of these market allocations.

CHAIRMAN HUNDT: You mean, in other words, if you have two competing applicants for a spectrum, the one who pays the most is the one who we should assume values it the most highly since they are paying for it; and, secondly, we should assume that that will generate the greatest value to the economy. Is that what more or less what you are saying?

MR. HAZLETT: Yes, barring monopoly problems which are an issue --

CHAIRMAN HUNDT: Barring monopoly problems.

MR. HAZLETT: -- that I think we are aware of.

CHAIRMAN HUNDT: Phil, I agree with much of what you have said but, I still want to ask a couple of questions to be maybe just mildly provocative.

The public safety community performs a wonderful function for the United States. There is no question about it. The fire departments, the police departments are filled with people who are public spirited and put their life on the line, yet, as a country, we do not give our public safety community free access to oil leases so that they can convert that oil to gas and have gasoline to run their trucks. We instead make them go and purchase gasoline the same way that the rest of us have to purchase gasoline.

Is there something distinct about spectrum that we should grant it as a quasi-property right to the public safety community in the way that we really do not give any other good to the public safety community? What is the distinction here?

MR. VERVEER: I do not know that there really is a distinction. Like so much else in life, historical anomaly turns out to be important. And, in this particular case, in a high level of abstraction, you are certainly right that, there is not much difference between the spectrum and

something that comes out of a petroleum reserve that happens to be owned by all the people. But, as a practical matter, I think it is too late to -- or, at least, if it is not too late, it would take a very long transition period to permit the governmental entities that provide public safety functions to figure out some way to contend with the fiscal requirements that would be raised if this spectrum were made available on the same basis as it is made available for commercial users.

CHAIRMAN HUNDT: If we were willing, as a country, to fully fund our public safety community, to put enough money in the pockets of the purchasing agents for the police departments and the fire departments, that they could then compete in a market for spectrum rights, wouldn't that be satisfactory?

MR. VERVEER: Oh, sure. As Tom said, the first best choice would always be to use the general revenues, the treasury, and fully fund these sorts of things. But that is not the world we live in, and it appears to me that it is not going to be the world we live in at least for the foreseeable future.

CHAIRMAN HUNDT: Suppose we were to hold an auction of some spectrum that might not otherwise be auctioned in order -- in other words, to divert some of the

money into the public safety community, then we could create a market condition in which we would be much more likely to get efficient uses of the spectrum by the public safety community. Would you agree with that?

MR. VERVEER: I agree with that, although what you have described is in the nature of an internal subsidy, and those are almost certainly less efficient than making use of the general revenue-raising mechanisms and less progressive, and so forth. But, yes, if there were some modality available to provide the funding, then there is no reason why ultimately the public safety community should not bid for spectrum just like everybody else.

CHAIRMAN HUNDT: Well, we have come to the end of the Q&A portion, and now we are supposed to devote the next 30 minutes to free for all or to a Quaker-like quiet time for contemplation of these heady issues. Let me begin by asking if there is anyone here who would like to volunteer any comments at all. I will give you a chance to in the most open-ended way possible. Craig?

MR. MCCAW: Let me cause a little trouble on the notion that spectrum is like real estate and the free market totally applies. And, by the way, I am a great believer in the free market, but there is a tremendous value of compatibility in the pricing and value added to customers;

and, therefore, if spectrum gets completely polluted in terms of different uses that cannot be moved -- in real estate we have public acquisitions through eminent domain and other things like that. But this is a multi-dimensional product, and if we ask the manufacturers to build products which go through many multi-band machinations, they will not achieve the manufacturing economies and be able to deliver these new and innovative services.

Secondarily, on a global basis, rightly or wrongly, we may not be the center of the universe, and we may need to consider the need to have global compatibility of services, which may not be possible if we look too retrospectively and have things which occupy the spectrum and are valuable, may be of a very high use, but, on a global basis, impact the competitiveness of the country as a whole. And that can, and does, happen; and we see it in broadcasting with different technologies used in television, the competitiveness there.

I think we do have some obligation to protect our competitiveness and the compatibility nationally. As important as states' rights are, we still are one country, we are one continent, and I think some of that must be considered as spectrum goes out the door and gets used or reused. And we cannot completely overcome through

technology a complete chaos in the spectrum. And I know that is not what people are implying but, nevertheless, it is not as simple as real estate and deserves that consideration.

COMMISSIONER NESS: You do the real estate analogy. Following up on that, in most cities and towns, you have zoning. You have at least some sense of the factories are located over here. That prevents some of the smog perhaps from coming over into the residential areas. It also probably is going to be located in an area where there are natural resources that are particularly helpful to industry.

You have residential areas that are pretty good locations to put schools. You do not want to have a school in the middle of factory, probably. You would probably want to have it as close as you can to where the kids are, if that is at all feasible, and so on and so forth. So that there are some basic distinctions that are made which, historically, at the Commission, have been in terms of bands and allocations.

Maybe there is an opportunity to make it a little bit more flexible, but if I understand what you are saying, Craig, sometimes the sum of the parts is greater, or at least the whole is greater than the sum of the parts in the

sense that having a television set in which there are, within a reasonable span of spectrum, a number of channels that are dedicated to whatever those video services might be for receipt of signals on the television set, might be more useful than having between Channel A and Channel F a lot of other services that cannot take advantage of or that the consumer cannot take advantage of when they use the television set.

Is that essentially the point that you are making there?

MR. MCCAW: Or that creating that set would be so expensive for the consumer, that the individual needs of a market like Chicago might be very counterproductive in Omaha.

COMMISSIONER NESS: Dick?

MR. PARLOW: Thank you, Susan. I think we all recognize that telecommunications -- and, particularly in the radio communications area, we are becoming more of a globalized society than one that is just constrained to the United States and that we see that every day when we deal with other administrations when we try to bring proposals to the ITU, when we try to get agreements. And that is very key.

I think that if we are going to be competitive in the

world marketplace, we have to establish basically a framework in terms of how we are using the spectrum. But within that framework, I think we have to assure that there is considerable flexibility in terms of how it is used. And there, I think, we end up finding a very, very good blend and a very good mix because if we are trying to create jobs, export equipment, we have to recognize how our exports, how our use of the spectrum can be translated into use overseas in terms of markets, either common spectrum, adjacent spectrum, things that look somewhat the same.

When we go and try to establish international systems, especially satellite systems, we have to be very, very observant and very aware of how that spectrum is being used around the world because we could end up, just using the ITU's analogy, we could have 100-and-some-odd different uses perhaps in a block of spectrum and try to rationalize how to take and get around that problem. It is an extremely difficult problem, so we have to be very much aware of how spectrum is being used internationally as we make our decisions.

And one last point -- and, Susan, I think you are quite aware of one other point, this point that I will be making -- is that when we go and make decisions in the international arena with regards to regulatory decisions

about spectrum or standards or whatever, that when we come back, we have to be very consistent, and we have to rationalize what we are doing. If we do things different domestically than what we have negotiated internationally, we can find ourselves in a very difficult situation.

So there has to be a degree of consistency and integrity in terms of how we function. The point I am making is, we cannot always do things on our own. Thank you.

COMMISSIONER NESS: Peter Murray?

MR. MURRAY: Thank you. Mr. Chairman, in your comments you sort of threw it out where we could more or less say anything that has been discussed this morning. I have three points that I want to make. When I became a U.S. citizen, where you have to study and go through questions and answers, one of the things I studied was that income tax was one percent and it was only going to last a year or two; so that was the first thing.

The second thing that we have to remember -- and it has been used over and over again today -- is the word "public." The United States represents we, the people; the spectrum belongs to the public. If we look at the large cities, and if you look at cellular -- I defy practically anybody to name the 90 top cities in the United States one after the

other like that, but that is how small you are talking about; there is more than 90 cities in the United States.

So, if you are looking at the public side of it, the public service side of it, whether it is for aircraft, security, or public safety, there are cities, some of them that are very small, that to raise any amount of money is very difficult for them, so it is done with property taxes; there are large cities where to come up with enough money to pay for the public services, that is also very expensive. So, therefore, to say that the public services, such as safety, has to bid for spectrum and that they might lose is quite an interesting thing.

I believe that the public spectrum, the spectrum which belongs to the public should also be used for the public without additional cost. It is already being paid for in taxes and property taxes.

The other area which I believe is something that has been overlooked -- again, I would like to come back to the unlicensed, and this is where technologies that reuse spectrum, share spectrum with others, can be done. Certain companies -- I know of at least two -- who said that a lot of their revenues, a great portion of their revenues this last year was raised in products that were not even available three years ago, let alone ten years ago, three

years ago.

So Mr. McCaw's statement that manufacturers will have difficulty in doing things; that's true. Manufacturers will have difficulty; but manufacturers, in order to stay in business, are going to build these products. All they need to know is what to build. So then we come back to what was just said about the international market. It has to be looked at so that we know what we billed has the economy of scale of manufacture that can be transferred to other countries. I think that is a good point that should be kept in mind, so those were the comments I wanted to make.

CHAIRMAN HUNDT: One of the points made earlier was that we have much more demand for spectrum than we appear to actually have spectrum to meet. This is in part because we have already given away most spectrum by assignment or by auction, so I have a question. With respect to spectrum already given away by assignment or auction, does anyone have any ideas for how we can encourage more efficient uses of that spectrum?

COMMISSIONER CHONG: Mr. Chairman, as a corollary to that, if we think of usage as outdated, for some reason, how do we go about taking back the spectrum?

CHAIRMAN HUNDT: No one has ever voluntarily given it back, I might add.

COMMISSIONER CHONG: Well, that is my point. There could be inefficient uses out there, and when you have incumbents on the spectrum, it is very difficult to take it back. But what if it is, for example, a spectrum hog in light of technology development? Who should make that decision? Should it be the Commission, and what do we do about the incumbents?

MR. HAZLETT: Well, I think the Commission has policies right now, and they have studies and public statements on the importance of voluntary reallocation. What is going on right now in the PCS bands is so important to look at. You are actually getting the reallocation, a very efficient reallocation of spectrum, and we did not have to spend a decade at the Commission to do it.

We did not front load the entire process and say, how are we going to get all these people -- the people that are moving in the PCS band were the people who said, you know, children would die if anything was done to change the existing allocation, and now there are financial deals that are being worked out and movement is afoot, there are rules that are being worked out because there are some margins on the negotiation that need rules in place so that the transition occurs smoothly.

But the Commission is very right in what it has written

on voluntary reallocation being the efficient way to go about this. In 1991, if somebody had asked, "What is the demand for PCS?" and people did ask -- in fact, people asked me, "What is the demand for PCS?" and I was always tempted to say, "Well, it is a very complicated equation. I think it is far too technical for you to understand." Because you know how technical reasons tends to make people go away and worry about another issue.

But the Commission had a good idea that there would be some action in this area because they had been petitioned to do something, so that was a good sign from the market, plus we could see what was happening in cellular. But the Commission, you know, could be accused of abdicating its responsibility. It did not minutely micromanage the service definition. It did not prescribe a given technology for PCS. It did not front load the process. It got those licenses out with broad definitions and a lot of flexibility, including the flexibility to get the old users out of that spectrum and go somewhere else.

COMMISSIONER NESS: But if we mandate that the present incumbents have to leave, they cannot decide that because they would continue to provide point-to-point microwave that they want to stay; they will stay.

MR. HAZLETT: Well, they --

CHAIRMAN HUNDT: What do you mean by "voluntary time"? It is compulsory.

MR. HAZLETT: Not instantly. I mean, I certainly would extend that principal, and the FCC has in its studies.

COMMISSIONER NESS: And if 90 percent of them decided if they were not required to move and if 90 percent of them decided, "Oh, no, we like it just where we are, thank you, what would happen to PCS?" And we did decided that it would be serviced for PCS, the mobile services, and that did help to get that engine off the ground so that people knew that that was where they could go to bid for that sort of spectrum.

MR. HAZLETT: Right. But the service definition was extremely broad, and that is why we are finding these new services coming into that band now; and, in fact, who moves first and who moves when is being decided by these market negotiations. I think that principle should be realized and studied and extended to answer exactly this question of how you get people to free up spectrum. And, in fact, when somebody has this license and they are doing something that is inefficient with it, which they have an incentive to do if there is a rigid definition and that is all they can do with it, sort of use it or lose it, use it inefficiently or lost it, actually, if they have the ability

to get flexible with it, they will have the incentive to reallocate voluntarily. They will sell out to somebody who wants to provide the new service and provide the new service themselves. That is the economic incentive, and that is a very powerful principle.

CHAIRMAN HUNDT: Well, let me see. I understand you to be saying that we can promote efficiency of use by auctioning the rights to use spectrum that already has incumbent users, and by giving --

MR. HAZLETT: On an overlay basis.

CHAIRMAN HUNDT: -- on an overlay basis, and by giving the incumbent users the rights to be moved, -- in other words, to be paid to move and, therefore, letting the market cause them to find new locations -- and also I understand you to be saying that giving flexibility of use to the auction winners is crucial to promoting efficiency. Is that a fair summary?

MR. HAZLETT: Yes.

CHAIRMAN HUNDT: Does anyone disagree with any of those propositions?

MR. MCCAW: What I think I also heard was that the user had -- in other words, let us take this microwave user and 1.9 gigahertz, you do have a question of whether if by giving them flexibility and they will not leave, let us take

most of the PCS markets, if two or three of those people stay on the air, -- and we did a lot of analysis on New York and other markets -- if they did not move, you could not run the PCS operations.

So you do have to get them out, and I think it is reasonable; the market approach did work. The question is, if they are freelancing completely within the spectrum, you could end up with a rather peculiar process, and so the overarching rule the Commission followed, which was that there was a better use for the spectrum, was the important one, and I think the process has worked very well, as Tom has noted.

CHAIRMAN HUNDT: Lynn?

MR. CLAUDY: To go back to the original question, I would submit that the advanced television process is an excellent paradigm, at least within the broadcasting paradigm, for moving towards spectrum efficiency. The digital TV services that are talked about have tremendous flexibility to offer new kinds of services and a great deal to offer the public. But in terms of getting spectrum back after the transition is over, that is exactly what would happen. The analog channels come back, and there would be a reclamation of at least 20 percent of the existing spectrum that is allocated now for television that could be put to

other use. So within our industry, we think the move towards digital gives you both flexibility and moves towards spectrum efficiency and gives spectrum back to the government.

CHAIRMAN HUNDT: With respect to the flexibility issue here, in your statements you say, "a bit is a bit is a bit." Could you expand a little bit on this statement a little bit?

MR. CLAUDY: Maybe we could take the last bit off. The notion that was attempted to be expressed there was that if you are transmitting 20 megabytes per second, as you do in a digital television signal, you can take all of those bits and use them for ancillary services, you can take all of those bits and transmit highly detailed pictures and sound, or you can take all of those bits and apportion them among a number of television programs. The signal itself does not know which bit is which; you simply address them and packetize them differently. So it was in the context of how bits are apportioned.

CHAIRMAN HUNDT: So, with respect to trying to promote efficient use of spectrum, should the FCC tell those who hold licenses for digital television what they ought to use those bits for? Should we tell them that those bits ought to be used for voice or video or data or specific

percentages per second of any of those categories?

MR. CLAUDY: There is at least a public interest argument, as we have said in our comments in the proceeding over the years, that broadcasters are broadcasters and want to continue to be broadcasters. So the basic requirements that are set up in the public interest ought to be held continuously through the digital transition. Beyond that, I think there is a point of debate about how much the Commission should penetrate into the service definitions.

CHAIRMAN HUNDT: Using this as an example of promoting efficient use, does anyone else have any comments on this question of whether the government should, I guess, on a per-second basis, say what should be the nature of the product communicated by these bits, voice, video or data?

MS. MAYER: Part of the problem with being very precise in the definition is, as many people have noted, what customers want changes, what competing technologies or competing services offer changes, what people are willing to pay for and not pay for changes, and so what may be the right mix today may five years from now be very different in the marketplace. And so someone who is -- broadcasters, if it is determined that they have to provide a certain mix of -- it today it is determined that they have to provide a certain mix services, maybe even when they are just starting

to be in service with a digital format, the cable companies, the DBS providers, whoever else is providing video services, may have a different package of service, may have a different panoply of things that they are offering which could potentially put the broadcasters in this example at a competitive disadvantage in the marketplace.

So, yes, there may be some policy or public interest in the case of broadcasting requirements that the industry would all agree to live with, but beyond that, bare-minute framework. I would argue that they ought to allowed to provide whatever makes sense economically from a business point of view in the competing marketplace.

CHAIRMAN HUNDT: We have been told in previous hearings that the digital television licenses in Washington, D.C. could be used for 50 standard-definition channels. Should we have a rule that says that is what you must do with all of these bits, 50 over-the-air, standard-definition channels?

MS. MAYER: If you do that, you are defining how the broadcasters make their money and, to a certain extent, limiting the amount of money they can make if, in fact, that is not the most competitive product offering they can bring forward using that capacity.

CHAIRMAN HUNDT: So we might, in fact, be

undercutting the very goal, which is the guarantee of free over-the-air television if we define with too much precision what these bits can be used for. Is that your point? Is that agreed by everyone here?

MR. MCCAW: I think, as chairman of Lynn Television, I may have to resign after I make these remarks, but the tricky part of the high-definition television issue is that, for public interest reasons, those channels are not being auctioned, and I think it is probably reasonable for the Commission to apply some service-standard issues that the public interest continue to be served in the operation of those channels, if that is, in fact, the case. And, therefore, some reasonable policy there seems to be appropriate and fair in the process, not defining the signals standards but perhaps not granting the right to take the channels and do something entirely different than the public interest that was going to be served in the granting thereof.

CHAIRMAN HUNDT: I tried earlier to explore the proposition that ten free, over-the-air analog TV channels in Washington, D.C. seem to be about the right amount, so is there any reason to believe that five times as much is too much of good thing, still somehow the right amount? How do we think about this? Peter, you are raising your hand.

MR. MURRAY: Yes. It brings a question of time. If you have 50 TV channels, let's say, -- up in the New York area where I live there are many more than that -- there is the Internet highway where all of these wonderful things you can do if you get on the Internet. There is all the new technologies that we talked about today that are going to come along, great, and you have also got a job to pay for these services. Who has got the time to watch all these things, to use these things? Nobody.

CHAIRMAN HUNDT: That is our job, Peter.

MR. MURRAY: I'm sorry?

CHAIRMAN HUNDT: That is our job. We have to watch this all of the time.

MR. MURRAY: Well, maybe I should come and get some good lessons.

MR. MCCAW: I will throw out an interesting, fascinating fact that television viewing from 1971 to 1993 increased ten hours per week per household, from 42 hours up to 50 hours per week of television household viewing, so people are doing an awful lot of it.

MR. MURRAY: Well, but this is what I am saying. There are more and more things coming along, so, therefore, the use of the spectrum -- in other words, broadcasters will put in, and they will have these extra bits floating

about -- I agree they have to be able to use those bits to provide services that the public want. I mean, I know the three channels I watch. When I get to a hotel and they are not there, I am very upset so; I read a book.

CHAIRMAN HUNDT: Well, if we have five times as many channels, are we going to be watching 250 hours of TV a week?

MR. MURRAY: Exactly.

CHAIRMAN HUNDT: But there is an issue here. How are we supposed to decide this? is my question. Andy, did you want to comment about this?

COMMISSIONER BARRETT: I did not want to comment. Why don't I let you finish, and then I want to ask another question?

CHAIRMAN HUNDT: You go ahead -- or, wait, I think Dick wanted to jump in, and then you.

MR. PARLOW: Being somewhat of a technologist, I think the introduction of digital technology has offered us all very significant advantages in developing telecommunications infrastructures. With regard to television or whatever, it seems to me that within some limited framework, one could define what type of service is going to be provided. But for the remaining capacity that is there, for the remaining bits, so to speak, I think that

the digital sort of revolution affords entrepreneurs and operators a wonderful opportunity to sort of get out there and provide new services, new innovative types of add-ons to the baseline and I think that to dictate to how they are going to be used or what mix there is going to be there, I think that is like sort of a dangerous in the sense that you are trying to pre-guess and sort of jump ahead and get ahead of the power curve, so to speak. And I think that the marketplace has a real role there, and so we ought to let nature take its course, to a certain extent, with that excess capacity and being able to use it and do not fully dictate what has to occur.

MR. MCCAW: By the way, I think, as we think of broadcasting, it will become much better in our minds as there is more diversity available to free television; and I think, in defense of the industry, when you have to operate on one channel only or one signal only, you tend to go to the lowest common denominator for good economic reasons.

As we saw with cable, some interesting and innovative services, educational product, tend to evolve from more diversity, and I do think that we are going to actually like the broadcasting industry a lot better than in five years as diversity is allowed and these stations can be programmed almost as we saw with radio, where more diversity occurred

as a result of more stations being granted.

So I do think there is going to be some significant positives coming from additional channel diversity for local broadcasters and the networks.

MS. MAYER: And, also, your question of what do we do to solve the quandary of too much demand and not enough capacity. If you think of digital TV, it is not just what analog TV is today but a broadcast pipe that is capable of delivering a whole range of signals, then we solve some of these capacity problems in other areas by letting that pipe very efficiently deliver signals in addition to traditional TV signals that we see today.

CHAIRMAN HUNDT: But doesn't that argue in favor of us not having a government policy that designates bits as destined for any particular commercial purpose, whether it is voice, video, or data, a bit is a bit is a bit; go ahead and stream out whatever the market requires?

MS. MAYER: Well, personally, I would be where I think more most of the panel is, which is, in the case of broadcast television, there is some public interest, some public policy issue that defines a minimum amount of the capacity of the station of that system, but beyond that minimum, let the market decide.

MR. HAZLETT: But be careful of the irony of that.

COMMISSIONER BARRETT: Let me ask a couple questions. Susan, is efficiency and the finiteness, if I may, of spectrum, is that a consideration when you are looking for spectrum, to acquire spectrum?

MS. MAYER: I am not sure I understand your question.

COMMISSIONER BARRETT: Do you take into consideration the efficient use of how you are going to use it and the fact that, as you suggested, it is finite?

MS. MAYER: Yes, in the sense of -- we were talking earlier about what is the highest value people put on a particular piece of spectrum. The finiteness of that spectrum would have an impact on the value; the efficiency, how one is using it -- all, I think, determine the value. Whether that value is translated into an auction or not into an auction, those would all be criteria.

COMMISSIONER BARRETT: Okay. When the chairman started the conversation on value, is there not also a value in terms of raising the price of spectrum in order to block new entrants and in order to keep competition out, Tom? Susan? Have you seen examples of that?

MR. HAZLETT: Well, sure, I mean -- how much time do we have?

COMMISSIONER BARRETT: Have you got any examples

of that?

MR. HAZLETT: Well, look at the current DARS proceeding. You know, I got a call a little over a year ago from one of the applicants saying, "Professor Hazlett, we understand you are a telecommunications economist. We would like some help writing a study to show that we are not going to take any revenues away from the current local broadcasters." And I said, "Why don't you just get some affidavits from some people that have heard your service and they say it's really lousy?" And they said, "Well, you know, this is the way the game is played." And so I think we are in the sixth year of the DARS proceeding. Customers want competition, and they certainly want the opportunity to get, you know, CD-quality satellite music, information versus the local programs.

I think the funny thing in this particular proceeding is that the local programmers would have to get a lot more local to compete in a world in which they have the satellite distributed services, but that is holding up the proceeding now, and it takes a long time to adjudicate it.

COMMISSIONER BARRETT: And then, Phil, my question exactly was, Have you not seen a value of force spectrum to be used in terms of a blocking mechanism to stop the competition and to raise the prices to some extent that

anyone who has expertise, technologically and the academic background and experience, are almost prohibited from getting into the place because the price has been raised?

MR. VERVEER: Well, it is certainly true that the markets fail sometimes, and one of the reasons that markets fail is monopoly and monopoly power, so that there are antitrust-like considerations that have to be brought to bear in an environment of the kind that you have been talking about the last few minutes, in which there is free transferability and fairly well-defined property rights for the folks who are licensed to use spectrum. There is no question about that, that that is going to be, I think, a continuing issue for the FCC.

COMMISSIONER BARRETT: One of the things that, you know, when I saw the prices on some of the bids, -- I happened to be the chairman -- I said, "Why in the world are people paying that kind of money?" And the only thing that I could think of is they were trying to protect their flanks in a circular sort of a sense and that that spectrum had a value not so much in terms of services that they would be able to provide, but, rather, one in terms of being able to raise the prices to the extent that no one else could get in.

MR. VERVEER: Well, I have no idea what motivates

all of the bidding.

COMMISSIONER BARRETT: Well, I am glad they were motivated that way with the money, but I was always curious about it.

MR. VERVEER: I will say this. I think it is a consensus or close to a consensus among people who study neoclassical economics and antitrust activities that this is a -- while these kinds of strategies probably are pursued from time to time, it is relatively unusual and it would be pretty hard to succeed, particularly in the kind of world we are talking about now, where somebody who perhaps holds a license to do one thing would be able to either sell that license to somebody else to do a second thing or the licensee itself would be able to shift to do something else. So if there are not steep entry barriers imposed by the government in particular services, that sort of strategy is unlikely, ultimately, to be a successful one.

COMMISSIONER BARRETT: Let me ask one other, because I don't want to go over your time -- I know you want to try to stick as close to the breaks as we can. What impact do you think, Phil, and Craig, and Richard, obviously, you, will the new Telecommunication Act have on spectrum demand and certainly on what we would hope would be the more efficient use of spectrum, not to get into the

military aspect and the defense aspect?

MR. VERVEER: I think the new legislation, to the extent that it is successfully implemented here, --

COMMISSIONER BARRETT: It will be.

MR. VERVEER -- the new legislation is going to, I think, enable the convergence of a lot of activities. It is going to increase competition, putting an extraordinarily strong premium on efficient production of services and possibly lead to a world where, from the standpoint of producers, nimbleness, speed, attentiveness to shifting consumer demands is as important as sheer mass, is as important as economies of scale and scope, for example. And in that kind of a world, I would guess that there is going to be more and more demand for spectrum, even separate and apart from all the technology opportunities that are producing the increases in demand at any event.

COMMISSIONER BARRETT: Craig, could you address the first issue I talked about, in terms of the flexibility in terms of the value of spectrum, not only for providing services, but also where one might hedge their bets in terms of protecting certain areas around them, and then maybe answer Phil's -- the last question I asked Phil in terms of the impact that the Telecomm Act of 1996 will have on the marketplace and the spectrum flexibility and demand.

MR. MCCAW: Well, in terms of the ability to monopolize by buying, I think if you did not continue going, that opportunity probably exists; but based on these prices, I think we are not going to see that as the outcome, and so I would not be terribly concerned. This last round, of course, is going higher because of financing and other considerations and discounts, but I think it will all sort out nicely for the consumer and for the Commission.

COMMISSIONER BARRETT: Will it sort out for people who are newcomers who have everything except the capital? Will they be able to enter into the market?

MR. MCCAW: Well, I think many of them have been supported by other companies, and, therefore, I think they are in a reasonably no-lose situation. These are tricky policy areas, and the language is very important; but, in general, I think if money is lost in the C-band auctions, it will be mostly by bigger companies supporting smaller entities.

COMMISSIONER BARRETT: Okay. I will be quiet because I know you want to get to a break.

COMMISSIONER CHONG: Yes. I just wanted to wrap up. Our topic has been spectrum demand. It appears that we should be probably more proactive than reactive as we have in the past about spectrum demand. It sounds like there is

a lot of uncertainty about what it will be because of the pace of technology.

I will just throw out, in one sentence or less, does each panelist want to tell us if the Commission were to do one thing to track spectrum demand better, what would that be? Anyone?

MR. MURRAY: You said to track spectrum demand?

COMMISSIONER CHONG: Right, so that we can have better policies.

MR. MURRAY: Well, in the unlicensed, which is what I am representing -- I have to repeat that -- is the FCC promised 10 megahertz for the asynchronous, which it hasn't yet done, so it needs to track what it is doing with that additional 10 megahertz for asynchronous. The original spectrum granted for -- was 20 megs; it was reduced to 10. Then there is the actual use of data. There is the new five-gigahertz request that is in there. Then, with the TV side of it and also with the PCS as it comes on board, is it being used? Is it up and running? But then, going backwards to other industries, I think there is a lot of spectrum out there that is underutilized, but it is not something that you could just say what it is. An awful lot of backtracking has got to be done on the licenses, how they were granted and actually if they are still valid, and such

like.

MS. MAYER: If I could suggest a little bit of a different approach, I think you probably get inundated by the industry trying to explain to you how demand is going to evolve for different services or from our collective industries, and so my guess is you are constantly being presented with new applications and new services that require spectrum. Maybe the focus ought to be on tracking the existing spectrum allocations to see whether they are the most efficient use of that spectrum, and then freeing up, much like in the PCS case, spectrum when it is not being efficiently used and there is significant demand for that spectrum for new services or by new competitors.

MR. HAZLETT: I would just say, a lot of flexibility and let a thousand virtual flowers bloom, and that will track demand very nicely.

MR. TWYVER: I think with respect to -- combining this with Commissioner Barrett's question about the impact of the telecomms bill, clearly, in our mind, local access via radio wireless loops is going to be the biggest impact to spectrum policy from the new telecomms bill. Service flexibility that you are now providing in some of the current assignments goes a long ways there, but I think you need to look at reusing some of the existing allocations,

much in the same way that the PCS spectrum has been reused for wireless-local-loop kinds of applications.

MR. PARLOW: I think the Commission has to ask itself does it want to continue to deal just with the things that come in the front door or have some type of look-ahead capability. Now, if one wants to have a look-ahead capability, that gets really difficult, and I think that you may end up getting inundated with information if you would ask those types of questions, but that may be worthwhile. As a matter of fact, in many cases, that is what you are doing in the above-40-gigahertz area. You are looking, trying to project where the demand is, what you can do, how you can lay out the spectrum. To do that in the blocks which are must lower in the spectrum which have a lot of incumbents, that problem gets to be a lot worse, and I am not sure that the tools are there yet today to be able to do those types of things.

So maybe it is sort of a blend of looking at refarming types of activities, how is existing spectrum being used, are there other options or opportunities for the users that are there, and then look at the new demands that are coming along and try to match those types of things. And the big issue then is -- and has been raised by many of the panelists -- what do you do with the incumbents? And I

think the incumbents, there has to be some process where there is compensation in some form, maybe not always or across the board, but it is something that really has to be considered and continued to be considered.

COMMISSIONER CHONG: Okay. We are about out of time. Do you want the last word, Craig? You had your hand up.

MR. MCCAW: Well, just in terms of looking forward, I think it is clear we are a country that is a composite of the world, and to the extent that the Commission has been looking globally, different cultures will innovate in different areas. And I think there is a lot to be learned, as I know the Commission already is looking at global trends by specific region, where is it working, where is it not working. I think the Commission would also be well served to have a high-level technical advisory panel more available to deal with some of these issues of the changing use of spectrum and people without a particular self interest who can, on a routine basis, continue to advise the Commission and the engineering staff on technological trends.

COMMISSIONER BARRETT: Well, we would almost have to get somebody who does not live in the country who does not have an interest.

MR. MCCAW: Within reason, yes.

COMMISSIONER BARRETT: That person outside the country --

COMMISSIONER BARRETT: My first thought was that I see at least three people here who ought to be on that panel, but you killed that hope when you said one that does not have an interest. I am not sure. You would almost have to go somewhere else to find them.

MR. MCCAW: Within reason.

COMMISSIONER CHONG: On behalf of my fellow Commissioners and myself, I would like to thank the panelists. We will now take a brief break until a little past a quarter to the hour. Thank you.

(Off the record from 10:40 to 11:00 a.m.)

CHAIRMAN HUNDT: We are back on the record at 11:00 a.m. If I could get everyone to sit down.

COMMISSIONER BARRETT: Thank you, Mr. Chairman for your stick, your hammer, and you probably ought to use that hammer on your colleagues more often. First of all, I really want to compliment the first panel. I think they did an excellent job, and certainly this will be a continuation of what I think is an excellent presentation.

But, first of all, what I would like to do is to acknowledge some people who have not only played a major

role in this, but certainly a major role in the telecomm legislation. Where is Michael Riley, who is research assistant to the House Commerce Commission? Is Mike here? Yes, stand up, Mike. Be seen. Jamie Lanier and Andy Levin and Donald McClellan; where is Don? Don? We certainly appreciate the congressional staff members being here, and it certainly gives a sense of more importance to our committee -- our group, rather, our commission that you are here, and certainly we look forward to working with all of you all in the future.

Mr. Chairman, I am certainly pleased to continue what I think was an excellent panel the first time around and welcome these distinguished individuals and certainly my very good friend whom I have learned so much from, Walter Ku, who I will promise not to ask any hard questions. And, certainly, this panel will continue what I hope is some great insight into the many issues surrounding this important issue. Among other things, I hope the panel will focus on issues relating to the technology trends, certainly the continuation of spectrum efficiency and issues relating to the sharing of spectrum, and, hopefully, we can do that by starting off -- what I would like each panelist to do this time is to introduce yourself -- and I do mean to make a 30- to 40-minute overview of something or another,

otherwise, I will grab the chairman's hammer, and I will use it on all of you all.

But I would like to start to the right this time, with you, Don, as opposed to starting from the left. I tend to be more to the right than the last people who introduced you, so I will start to the right and certainly welcome all of you all, and we look forward to hearing your comments. And after that, I will have comments and some things about Commissioner Ness.

MR. STEINBRECKER: Well, thank you very much Andrew. I would like to thank Susan for inviting met today. This is an unprecedented opportunity for me to come here and talk about my favorite subject, which is a vision for telecommunications that is somewhat different than that we have had in the past.

I believe that the telecommunications infrastructure could become generic in the same sense that a computer platform is generic, and that services, which is what people are really interested in, could be provided as software package. This could, in fact, create an entirely new industry, such as the software industry that we have today, generating primarily applications for telecommunications in a services-like fashion. It also would provide an opportunity for a great improvement in the efficiency of

spectrum utilization. I believe that the cellular bands provide a vision of how efficient spectrum could be used. Commissioner Ness mentioned the allocation of property on the basis of zoning regulations. Well, in essence, that is what you did with the cellular band; you zoned it for cellular services. You did not assign channels, as in the FM band; you zoned the whole band for cellular services.

This provides several things. One is the opportunity for frequencies to be assigned on an as-needed basis so the frequencies can get used over and over again by the people who need them at the time that they need them. This concept could be extended to FM, it could be extended to television, and quite of a variety of other services that we now offer could be provided on a cellular basis.

This alone would greatly improve the efficiency of delivery of services and, particularly, if you put the onus on the user --

COMMISSIONER BARRETT: You did not think I said 30 or 40 minutes. That is what I said. I meant 30 or 40 seconds.

MR. STEINBRECKER: Well, no. Andrew, I just restructured everything for 30 to 40 minutes.

COMMISSIONER BARRETT: Okay. I apologize to you. I have been spilling water and everything up here this

morning, but thank you for your comments, and you will get a chance to go over that.

MR. STEINBRECKER: Okay. Good.

COMMISSIONER BARRETT: Dr. Ku?

DR. KU: Yeah. Thank you, Commissioner Barrett. My name is Walter Ku. I am a professor at the University of California in San Diego. As some of you know, San Diego is becoming the wireless capital of the world, and somebody asked me today, this morning what position I am taking, who I am representing. I guess I can say I am representing the wireless capital of the world, I guess. And my interest in this area is actually in the technological training, a couple of areas. One is the advances in submicron technology, both in the silicon and compound semiconductor area. So, basically, we are talking about 800 megahertz, "L" band, and go up to maybe 60 -- anywhere above 40 gigahertz. I believe that the advances in the compound semiconductor, particularly the minitechnology, will essentially provide some opportunities for some new initiatives in the mini midwave area.

As far as the other technology area of interest is, for example, looking at the spread-spectrum systems and some kind of adaptive interference suppression technique for the overlay. We talked this morning about the incumbent

microwave carrier, that probably if you look at the overlay possibilities. Another area of interest in, again, the technology area is the so-called "software programmable radios." This is an area of great interest, including multi-band/multi-mode type of radio, and another challenge is the low-power technology for both silicon and compound-semiconductor use. Thank you, Commissioner Barrett.

COMMISSIONER BARRETT: Ms. Strauss, and I want to compliment you because your organization, I worked a great deal with on the local level in Illinois on any number of things, and certainly compliment you for the great job that your organization does.

MS. STRAUSS: Thank you very much. I am here today on behalf of the National Association of the Deaf and the Consortium of Citizens with Disabilities. We have worked over the last 20 years or so to try to ensure that new technologies as they are developed are accessible to people with disabilities. Our main concern is that technologies, at the design and policy stages, take into consideration these needs. If they are not considered at the initial stages, then, unfortunately, retrofitting must occur, which is both expensive and costly.

The new Telecommunications Act fortunately incorporates and envelops that concept of universal design, which is

basically a policy of developing services and products that can accommodate the needs of the broadest possible number of Americans, including Americans with disabilities.

COMMISSIONER BARRETT: Okay. Thank you. Craig, and thank you for coming.

MR. FARRILL: Thank you very much, Andrew. I am Craig Farrill. I am the technical officer for Air Touch Communications. We are an international wireless service provider, and we are quite concerned today, and we wanted to reenforce a couple of the messages that a couple of the commissioners put forward, particularly one that Commissioner Ness put forward in a recent article regarding conversion of wire line and wireless. And this trend, we think, is a longer term trend, but a very significant one for you to consider as a commission, because the necessary steps to achieve that convergence on the type of functionality that you see on wire line in the wireless world are quite significant.

We do also support the notion of flexibility, but we feel that flexibility ought to be within specific bands and specific uses, and we will get a little bit more into that during the course of the panel. We have spent quite a bit of time, as we pursued our PCS licenses, looking into the topic of spectrum sharing and whether that was, in fact,

viable; and we found that it was extremely difficult, if not impossible, for certain applications to share, and we would be happy to share some of that with you as the meeting goes forward. I am glad to be here today.

COMMISSIONER BARRETT: Thank you very much for coming. Mr. Robinson from Texas Instruments.

MR. ROBINSON: Thank you, Commissioner Barrett. I am Gene Robinson from Texas Instruments, a senior fellow with that company. I am very pleased to be here today. The digital revolution, which has been brought about by the low-cost, semiconductor technology, has created the information age, which depends very much on wide bandwidths of spectrums for efficient communications. The technology trends of the 1990's have continued to be accelerating with the development of digital network society. This will continue to put pressures on spectrum demands as the information age continues to advance, and technology, the digital technology and the microwave technology, will be needed to help serve that need.

I think that we will need to evolve beyond exclusive spectrum and look at overlay spectrum applications in order to serve the many applications that will come down the road. We will need to promote spectrum sharing through various committees and various studies supported by the regulatory

agencies. The regulatory agency needs to be proactive rather than reactive. I fully agree with that comment that we heard earlier.

We need to very much have a national high-level technology panel to go address the technologies and their applications to serve the community at large and also to promote a national spectrum policy to help plan out the use of spectrum such that technology can be developed to go support that policy in concert with the growing demands and needs of the society we live in.

COMMISSIONER BARRETT: Mr. Reitmeier from the David Sarnoff Research Center. Thank you for coming.

MR. REITMEIER: Thank you, Commissioner. I am here on behalf of the Sarnoff Laboratories, which was integral in development of the analog color television system that we now use, as well as, more recently, the development of Grand Alliance advanced television system for terrestrial broadcasting, as well as the digital satellite system that is currently in use and has been the fastest growing new consumer product in history and continued development of services in LMDS and MMDS bands.

I would like to encourage the Commission to take three very deliberate policy actions. First, the FCC should make deliberate spectrum policy decisions that take into account,

in a balanced way, the technical considerations, business needs and public policy interests of the nation. New technology is not a panacea. A technical solution that is ideal for one application, like cellular telephone, may be completely inadequate for a different application, such as radio. Spectrum policy decisions must reflect the different needs and different applications and balanced judgement of business and public policy needs.

Second, the FCC should set unambiguous technical standards. These technical standards happen to maximize the value of spectrum and allow the FCC to make proper spectrum-management decisions in addition to preserving the value of spectrum by ensuring that frequency allocations provide reliable service to their users. In addition, FCC transmission standards are an early example of open standards some 50 years before the term was coined by the computer industry.

And, finally, the FCC should plan and execute long-range programs aimed at maximizing the public benefit of spectrum. The recent advanced television proceedings are a stellar example of how the FCC can actually create new spectrum by challenging industry to create innovative solutions and work with industry to effect a transition plan that will free up new spectrum over the long term.

COMMISSIONER BARRETT: Thank you very much. Mr. Battin, from a great company from Schaumberg, Illinois. We are certainly glad to have you.

MR. BATTIN: Thank you, Commissioner. My name is John Battin. I am here on behalf of Motorola. I personally have been involved in the communications business and spectrum issues from the early days of mobile radio and was primarily a public safety/police communications through the days of paging, through the days of cellular, through the days of PCS, and now I am managing the multi-media efforts for Motorola, which is, in fact, a program to make the recent telecommunications bill really happen and supply the equipment to provide that competitive market.

Over the years, I have watched the technology and the need for services side by side, and each time we have invented a new technology that might solve the spectrum problem, we have always invented more uses than we have managed to invent more spectrum. So I guess my basic premise is that technology is a tool to solve some of these problems, but if we are looking for a technological stroke that will solve the spectrum problem, it is not likely to happen because every time we come up with a technology that will help, we will come up with sets of new products that will increase the demand even more than that.

COMMISSIONER BARRETT: Thank you. Paul Baran, who is wearing two hats, and one is the chair of Com 21, Inc., and certainly is here today on behalf of CTI. Thank you.

MR. BARAN: Thank you, Commissioner. I am really here as an individual contributor, and I would prefer that, in case I say something altogether too wild. Commissioner Chong has suggested that I be provocative. That is an offer I cannot refuse.

COMMISSIONER BARRETT: Well, given Tom, Will, and Brian Funt, they need a little provocation, but they are relatively dull individuals, you know; so add something to that place.

MR. BARAN: The point that I would like to discuss is I think we have all the spectrum we need. I think that the Commissioner this morning -- the chairman, rather, noted that everybody wants more spectrum, nobody is willing to give it up, and the only place we can really get it is to use new technology to make much better use of spectrum that we have; and we can get into details of this as we go along.

COMMISSIONER BARRETT: Thank you, very much. I am going to turn this over to Commissioner Ness, but before I do, if I could change the gender, she has certainly done a yeoperson -- not a yeoman's -- a yeoperson's job, and, you know, the great thing about it is she buys us pizza late at

night, and as I was going out of the office about 8:30 last night, they had these three big bags of pizza coming in, and I missed it because I was afraid that she would put me to work. But I certainly want to compliment Commissioner Ness for having done a great job. Certainly, this is not a one-month thing; this has been going on for several months on her behalf. Donna is not here; I wanted to compliment Donna, and certainly I would like to compliment her staff on for having done such a superb job on putting this together, and I will turn the first question over to Commissioner Ness.

COMMISSIONER NESS: If I can do a little rebuttal on that last comment, this really is an activity of all of the commissioners and the Commission staff, and they have been terrific in working through a lot of these ideas and thoughts. This is something that we all found would be real useful and we all found would be both entertaining and, hopefully, helpful as we proceed with so many of the dockets in the weeks and months and years to come. So I appreciate the compliment, but really it should not be directed at any one office or one person, but, rather, to the Commission as a whole.

COMMISSIONER BARRETT: Well, you can turn it down, and I will take it all back, then. I did not mean a thing

that I said.

COMMISSIONER NESS: The next two votes are yours, Andy, but that is all right.

A quick question on the use of flexibility within the spectrum. In your testimony, Mr. Battin, you talk about certainty and stability in allocation prices and that these kinds of rules are important to manufacturers, such as Motorola. Could you define for us what you mean by "flexibility"? Is it technical, is it service, is it both; and what principles should we use in looking at providing greater flexibility to licensees?

MR. BATTIN: Well, I like your analogy in the prior panel to spectrum allocation being more like zoning. There is a lot of things that go on to do a spectrum allocation that reflect directly on the cost of the end-user equipment. For instance, police radio of 15 years ago, where we had the possibility of having a base station on one side of the street and a base station receiver on the other side of the street on the adjacent channel made us build a very, very sophisticated product.

In comparison, cellular products that have more controlled interference, where the base stations are collocated and you are pretty much protected from having a big bombing signal on the adjacent channel, our receivers

have a 1000-to-one difference in adjacent-channel protection than you would have in the early days, where, in fact, there is not this organization of the spectrum.

So my position would be, within grants, you need to have flexibility of service, but, meanwhile, if you really want to have the most cost-effective equipment, there has to be attention paid to making sure that we do not have high-powered transmitters right next to very sensitive receivers. You know, we cannot put a steel mill in the middle of a golf course. I mean, there is some reason here that certain things can co-exist and certain things cannot.

COMMISSIONER NESS: So, basically, you are saying that the laws of physics have not been repealed --

MR. BATTIN: Absolutely.

COMMISSIONER NESS: -- and we really ought to be looking at some of those factors as we make some decisions in spectrum allocation, particularly, that there are vast differences between radio waves and different frequencies, for example, and we how we use them and how we look at the channels adds to efficiency, would you say, ultimately? In other words, if everybody could do what everyone wanted to do when they wanted to do it within spectrum, would there be, necessarily, some spectrum that would have to lie fallow because of interference with adjacent channels, for example?

MR. BATTIN: I think if we group the services, you know, in the proper way, you can keep from having gigantic guard bands.

COMMISSIONER NESS: Does anybody else have any thoughts or comments -- Mr. Steinbrecker? -- on that? I know you --

MR. STEINBRECKER: I agree completely with both what Paul said and with what John said. I think we have enough spectrum, and we just need to allocate it properly, and also I believe that the zoning applies very well. If we can allocate large pieces of spectrum to application and then let the markets and technologies work within that spectrum to utilize it most efficiently, I think that is the proper way to go.

As an example, in the CD players that we all use, if you have to provide analog filtering to the specifications required, you could not build a CD player, but that is all digital filtered. And if the signal levels are kept low enough so that we can do RF-to-digital conversion and then do digital signal processing, we can handle a lot more of these filtering problems very efficiently and very inexpensively. So it all fits together.

COMMISSIONER NESS: Does anyone else have any thoughts or comments on that point? Mr. Farrill?

MR. FARRILL: Yes, if I could just add that, you know, as we look at the larger systems -- and John mentioned, in particular, cellular, we have had dramatically improved efficiency in that area. Today, in Los Angeles, there are 50 people using every hertz, typically, on our system alone. So it is extremely efficient when you look at the number of people who are using each channel, and that is rising year over year at a rate of 50 percent, far beyond what we ever imagined was possible with that number of people.

I think there is one related factor that I would like to bring up early in the panel because I think it is an important context setter, and that has to do with the commercial wireless service applications versus those that might be used by the public.

Commercial applications, like the PSDN, have a higher standard of reliability, and there is a greater need for that to meet higher standards of reliability. Delay in PSDN is an unacceptable thing. And, as a result, we look at it as a commercial provider of service, that reliability is at the pinnacle of what we need to do for customers. And, for that reason, when you think about spectrum allocation, it is important to differentiate bands which are multi-use from those which are exclusive use for the purpose of achieving

reliability. And most of us who have studied the sharing proposals that have been made, we struggled with it for almost two years to find a way to get sharing between the microwave users in the PCS band to work with our own spectrum, and we spent several million dollars looking for the results, and at the end of the day we concluded that even though we knew exactly where these links were, we knew what power they had, we knew how they operated, but it was very difficult for us to ensure to them that we would not interfere in their direction. We could protect ourselves, but we could not ensure to them that they would be protected. Hence, their reliability was affected.

So, I think with respect to commercial wireless services, the Commission should deal with them really in two different ways. Unlicensed is open and maybe does not have all these rules. Licensed for commercial services has a reliability standard that attaches itself to some of the history that has been long created here that American telecommunications are some of the most reliable in the world. And, from our point of view, at Air Touch, we would like to keep wireless with that same reputation in the future, and that dictates a certain course of action that all of technology can help us achieve, but as a policy -- critical to what you all will be doing in the policy-making

you do.

COMMISSIONER NESS: You mentioned unlicensed. We have set aside some grounds for unlicensed services, and there seems to be a great demand for the unlicensed lower power services. The question I raised is, With unlicensed, how does one effectuate efficiency? If you can use as much of that as you want because it is unlicensed, where is the incentive to get efficient equipment and efficient use of that spectrum? Does anyone have a thought on that? You are shaking head. Does that mean that there is not a way of doing that?

COMMISSIONER NESS: Okay. Mr. Robinson?

MR. ROBINSON: I think when you think of efficiency of the spectrum, there has been a paradigm that we have worked towards of trying to look at very narrow segments of the spectrum and how do we pack as much as we possibly can into that part of the spectrum, and it is somewhat like memory on your computer; You never have quite enough, and if you look at the new software applications, you will not have enough in the future either; you will continually expand. However, if you look at the software applications and what they bring to you, they bring a lot more diverse, wider application to you than what you had three years ago, four years ago. So there is a trade-off.

But when we look at spectrum efficiency in the future, we may have to shift our paradigm and not think in terms of megahertz but think in terms of gigahertz, and when I say that is, is if you are going to look at overlays in spread spectrum and a way to put many services on top of each other but having quality service in each of those services, you may have to look at very wide spectrum use and fill up that spectrum with many applications overlaid on top of each other but with the types of codes and sequence codes and so forth that makes them useful.

Likewise, you have to apply digital signal processing to encode, modulate, demodulate, and decode that information. A bit is a bit is a bit. How many of those bits you have simultaneously and how you pull them out may be a different subject matter.

You can look at the GPS system, which is a spread-spectrum system that is designed to be jam resistant, and go look at some of those techniques and possibly look forward at the higher frequencies where we have the bandwidths available to us due to the higher frequencies, and it may be that studies will show that there are other ways of approaching the spectrum rather than on a per-megahertz basis.

COMMISSIONER NESS: Mr. Steinbrecker? Go ahead,

please.

MR. STEINBRECKER: The Internet works because information flow is controlled by the user, rather than by the broadcaster. If all Web pages were broadcasting, the Net would collapse. But in these areas where there is unlicensed spectrum use, one consideration might be to prohibit broadcast, in a sense, so that information flow there would be controlled by the people who need it.

MR. BARAN: In spectrum, you may want to add --

COMMISSIONER NESS: Mr. Reitmeier? I am sorry. I apologize. I have been keeping you waiting.

MR. REITMEIER: Commissioner, I would like to take you back to your zoning analogy, and I would like you to remember that every application is like a different kind of zoning. So houses have different requirements than light industry and has different requirements, again, than heavy industry. So, too, with communications applications. Broadcasting, for example, has a very different set of cost and performance trade-offs because you try to make trade-offs that push costs into the transmitter because it is a point-to-multipoint communication system. So you are trying to lower the cost of hundreds of thousands of receivers by putting cost in the transmitter. That is a very different situation than cellular telephony, where you can balance the

cost in a different way between transmitter and receiver.

The same issues of reliability that Mr. Farrill expressed from a PSTN point of view also apply to broadcast-type services. Imagine what it would be like if radio or television were sporadically interrupted by interference considerations; not acceptable. So each of the sort of cornerstone applications, in my opinion, justify some special consideration of the business and technical issues and, in fact, necessitate a zoning-type approach to proper spectrum management.

COMMISSIONER NESS: Mr. Baran?

MR. BARAN: I was just going to add that part of the zoning approach is setting limits on power, watts, or watts per hertz for power density, and in different bands you may want to have different limits; but I think it is possible for many to share the commons without necessarily one automatically hogging all the resources.

COMMISSIONER NESS: Yes.

MS. STRAUSS: I support the zoning approach. Currently, many schools and theaters use something called "auditory assistive devices," which basically are loops that enable hard-of-hearing people to hear what is going on in the schools, and, unfortunately, at the megahertz that these FM systems are currently used, they are inundated with

interference from pagers and cellular phones and emergency-dispatch vehicles, electronic equipment -- it is just overwhelming.

As a consequence, on a regular basis, teaching is interrupted in the schools. The Americans with Disabilities Act requires theaters to install these systems, but what happens is the deaf or hard-of-hearing person goes into the theater, the system is installed, yet it cannot be used. And then people wonder whether there was compliance. The theater wonders why nobody is using their system.

So there is a need where there is shared spectrum to ensure that devices that are particularly used for people with disabilities have their own carved-out area of spectrum.

COMMISSIONER NESS: Any opposing viewpoints on carve-outs in the unlicensed -- particularly in the unlicensed area? I mean, does that not ultimately look like you have a licensed use if you have those carve-outs?

MS. STRAUSS: Yes.

COMMISSIONER NESS: Okay.

MS. STRAUSS: And, to the extent where there are unlicensed use, whatever technology is needed to ensure that that unlicensed use does not interfere with the licensed spectrum would be needed.

COMMISSIONER NESS: Mr. Robinson?

MR. ROBINSON: From a technology standpoint, I would like to point out, even with carve-outs, if you have some in adjacent frequency, that can cause interference, and that gets back to a design and a cost issue associated with the device under use. And, many times, the environment is not comprehended during the design cycle to understand that there will be a 2 Kw pager sitting next-door or maybe on the roof that is on a different frequency, but it is powerful enough to cause that device not to function the way the designers envisioned it. Of course, he never envisioned a 2 Kw pager sitting on the roof.

COMMISSIONER NESS: Thank you, Mr. Norman.

CHAIRMAN HUNDT: Commissioner Chong?

COMMISSIONER CHONG: Thank you. I have a burning question for Mr. Robinson from TI. He says that TI strengths are in the research, development, and manufacture of gallium-arsenide, monolithic, microwave-integrated circuits. What is that?

MR. ROBINSON: A chip, it is a chip.

COMMISSIONER CHONG: Oh, it is a chip. Okay, a computer chip.

MR. ROBINSON: Basically, I think you are familiar with radios that come packaged in black boxes.

COMMISSIONER CHONG: Yeah, I have seen radios. I listen to them sometimes.

MR. ROBINSON: All right. Basically, that is a radio that is on a chip.

COMMISSIONER CHONG: I see. Thank you very much.

COMMISSIONER NESS: Okay. I wanted to go to Mr. Baran. Mr. Baran, in your testimony, you suggested that we were not fully utilizing our spectrum efficiently at this point in time; but I think I said on the last panel that not all spectrum is equal, and, by that, some spectrum is currently more useful and efficient, given current technology, than some of the higher bands, for example. But

But you say that the flowering of the digital age promises to give us the ability to pack more uses into less spectrum. And my first question is, How soon do we expect to see the benefits of digital technology and the efficiency that we hope to realize from it, and how quickly do you think the Commission should be undertaking the spectrum reform that you suggest in your testimony?

MR. BARAN: Well, electronics, digital electronics, is declining in cost about 40 percent a year, so the movement of the technology is very swift. Now, how long does it take to incorporate it, because we are dealing with a situation where we have the world of legacy systems?

There is a lot out there that you cannot change very quickly. So the earlier you start this process, the sooner we will be able to get there. So, in answer to your question, I would say immediately because of the long lead time involved.

COMMISSIONER CHONG: Now, you say that we should be moving away from the exclusive use of spectrum as a model towards a more flexible use, and you have been talking about unlicensed PCS as a real good example of this. I was wondering if you could talk a little bit more about the advantages and the disadvantages of flexible use; and, particularly, when you say "flexible," how flexible do you mean, to what degree?

MR. BARAN: Well, flexible -- to get back to a bit is a bit is a bit, the processing apparatus is not concerned with what is being transmitted, so let us assume that any new service can use the bandwidth any way it wishes to. We are living in the world of smart transmitters and smart receivers that have enough sense to move away from interference and enough sense not to step on somebody else's transmission. So we then find ourselves being able to use statistics much more effectively by taking a block of frequencies and being able to work anywhere in there. That is what cellular is all about. It is about taking a big

block of frequencies, depending on statistics, to use that block efficiently.

Now, there is no reason why we cannot do that for many other services that -- in days of old, when we had fixed transmitters and fixed receivers, we could assign and had to assign a single frequency for each, and if we tuned across the band, we would find most of that band empty. But if we pull it all together and share and take advantage of statistics, we can get much better utilization of the band.

COMMISSIONER CHONG: We have had testimony in the first panel, and I think in the third panel from some public safety people that talk about the urgent need for extremely reliable communications for police officers and the people involved in national security. Do you think that this technology can deliver to them the high level of reliability that they need, or should there be carve-outs for some of those types of uses in addition to perhaps the uses that Ms. Strauss just described?

MR. BARAN: I suspect an ordinary cellular system would probably be as reliable as what they have today, in most cases.

COMMISSIONER CHONG: But we want something better than that, don't we, for the future?

MR. BARAN: It is a good starting point. Yeah, I

think, you know, the question here, with everyone wanting to take their own service and think it is unique and take a small block of frequencies and think they will have reliability this way not fit the direction where technology likes to move, and that is sharing, commonality, software-based receivers and transmitters so that it is better and you usually come out ahead if you can share a common facility rather than trying to duplicate it.

Now, the company I am involved with, Metrocom, for example, the equipment is being demonstrated across the street uses the 902928 band, -- that is the garbage band, ISM band -- and it provides very reliable communication with little transmitters on street lights, and if it encounters interference, fine, it will use another path, another route. So the net result of networking this way gives you a very reliable system, a system that is far more reliable than any of the components that comprise that system.

COMMISSIONER CHONG: So with this sharing idea flexibility, how do you view the Commission's activities, lately with auctions, for example, because auctions to me suggests more exclusive use by licensees? Do you think this is a good thing, or do you think we are going the wrong way?

MR. BARAN: You know, I think they are two separate categories of users. In the case of PSC or

cellular, you have a monolithic organization providing the service; you have a homogenous base of users, you have enough scale so it makes it practical the sharing of a single band. If that works fine, auctions can be justified in such a case.

Let us consider a second case where you have a large number of smaller players where the market is unproven, -- and this is the place where probably the greatest innovation is taking place -- requiring the large up-front spectrum payment would be deadly to innovation in those cases. Here, you have the same need for a large block of frequencies shared by many with heterogenous applications and needs and ownership.

In the second case, I think the idea of spectrum auction is probably not nearly as effective as in the first case.

COMMISSIONER CHONG: Anyone want to chime in at this point? Mr. Steinbrecker?

MR. STEINBRECKER: Yes. I think, basically, exclusive use of spectrum does not mean necessarily exclusive service. For example, many different cellular services could be provided over cellular bands, and they are. We provide cellular digital packet data, for example, which is even credit card verification and stuff like that

over the cellular bans. The cellular operators have basically part of the infrastructure, and it should be possible to continue to add many, many more services over those cellular networks.

And then I would like to comment on one more thing about the emergency services. In most cases, those involved are large transmitter and a bunch of receivers. But we never light a room with just one bulb. You know, you always find a whole bunch of bulbs distributed, much like cellular. And cellular provides a much more reliable foundation for emergency services than does a single transmitter, which is going to be shadowed by buildings and other things.

So I would suspect that in the long run, the cellular systems and the cellular concept would provide much more reliable services to emergency vehicles and others than does the services they now have.

COMMISSIONER CHONG: I will start with Mr. Battin and go down the table.

MR. BATTIN: I have two points, one more general and one to totally disagree with that last point.

COMMISSIONER CHONG: We are getting provocative, finally.

MR. BATTIN: I think it is important, when we look at visual technology and looking at what happens to the

computer, not to do as George Gilder has, to take that to an extreme to say, Obviously, we can do all of this with technology and we don't have to worry about spectrum. We don't need the FCC anymore.

I almost, with digital technology, come out the other way by saying that one of the -- as you apply digital and computer technology to an RF environment, the first thing that you run into is the problem of trying to handle this dynamic range problem, you know, the problem of having adjacent channel systems where there is big signals and at present you are trying to listen to little signals. So I think to apply the new digital technology, I would say, hey, we really do need some fences. We really do need to have specific services lined up in such a way that we can use the new digital technology properly. So I start out with the same thing and probably come out with a different answer than he.

Speaking to public safety, public safety was the breeding ground for many of the things that we now see in cellular. When we first put portable radios on the policemen, we put them on the firemen. We put them on the policeman when, in fact, the average consumer could not pay that price, but, meanwhile, there is enough premium on the life and there is enough premium on that service to where

cost was not necessarily that much of an issue. I have a prototype of something that we could for public safety now, to where we could have a policemen be able to take video pictures on the crime scene or be able to watch out the front window of his squad car to see when he pulls someone over so the dispatcher can see exactly what kind of trouble that officer is in. That could be done but, we need spectrum in order to do that.

And I guess I would say there may be some services that a police department has that might be able to be handled in a combined system, although I would be very careful of the latency, which is, I mean, when a policeman wants to press the button to say, "I'm being threatened", you know, "someone is about ready to shoot me," you really would not like to have that system busy. You would just absolutely have to be able to get that message through.

So I think that there may be some combination where some of the things that we might do in public safety may be well done in a common system, but I think we need some public safety spectrum to continue to push technology and do things like this, which not only will be good in the public interest, but it also will fuel the next round of things that we may do in the other businesses.

COMMISSIONER CHONG: Is that existing technology

in your hand, that little doo-hickey?

MR. BATTIN: If we had -- by the time you can give us an allocation, we can build this.

COMMISSIONER CHONG: Could you send something like -- oh, that was a plug, John. No commercial messages. So could you send something like a mug shot or a fingerprint to an officer out on the beat?

MR. BATTIN: Absolutely. Absolutely

COMMISSIONER CHONG: That is pretty neat. I think you had your hand up.

MR. REITMEIER: I would just like to comment that the issue of sharing is becoming sort of a buzz word for let us do, let us have good spectrum efficiency. And I would just like to point out that different kinds of sharing are appropriate for different kinds of applications. So the kind of sharing you do in cellular telephony, where some blockage is acceptable sometimes, sometimes you do get a busy signal, it is probably different than the kind of sharing that you do for a public safety application; and it is probably different, yet again, from the kind of sharing that you do in a broadcast application.

For example, where the advanced television spectrum is designed to sit interleaved in the taboo channels that are currently unusable in analog television, there is a

different kind of sharing mechanism that is appropriate on an application-by-application basis.

COMMISSIONER CHONG: So do you generally agree that we ought to have fences, then, and put different types of systems requiring different --

MR. REITMEIER: Yeah.

COMMISSIONER CHONG: -- levels of reliability?

MR. REITMEIER: Absolutely, because, otherwise, the solutions will not meet the economic needs of the underlying business.

COMMISSIONER CHONG: All right. Someone at the end, I think, had -- Mr. Farrill?

MR. FARRILL: Yes. I just wanted to add that, on the reliability side, when you look at how reliable a transmission can be, there is a sense of timed urgency to that that John is really talking about. I just want to amplify this for you and give you an example of how in our day-to-day lives, we make this decision everyday. If I need to get a piece of information from here to Los Angeles this second, I have a few options. If I am willing to wait two hours, I could send a fax. If I am willing to wait until tomorrow morning, I can send next-day Federal Express. If I am willing to wait two days, I can send it by the Post Office -- well, maybe not.

COMMISSIONER CHONG: Two or three days.

MR. FARRILL: Two or three days. The point being that you have a time expectation with how quick you need to have that communication go through. And as you look at licensing, the assurance you can give a customer, as an operator of a service, has to be very high. When you have a voice call, it has to be there now: It is instantaneous, real time, voice communications. That police officer on the beat, chasing a criminal needs it now. There can be no blocking; it would be unacceptable to him.

On the other hand, if you have a son or daughter accessing the Internet and they are willing to wait 20 minutes to get the response back, they can wait 20 minutes, it may be free because it worked its way into the other traffic and it was free. So there is a very significant time sensitivity to this, and time and reliability are directly related. The more reliable you need the communication to be, the more intolerant of delay that you are.

One of the gentlemen mentioned Metrocom. Metrocom is a system we studied quite a bit, and it does have some significant benefits; however, the delivery time is a variable because of interference. And all radio systems have interference, and that interference can be controlled.

We have been very successful in cellular, as an industry, at managing interference within our own area. You have given us 25 megahertz to manage; we have produced huge capacities with that. There is something very important about that. One company was managing the protocol, the channel structure, the power levels. We set it all at one company. If you put 500 companies in that same band and say, "You guys work it out," it will be a very different thing, unless 500 companies can agree on power, channel structure, signaling protocol, bandwidth, emissions, and that can be done by industry. And we really support both, from a technical point of view.

We support industries that have high reliability standards, like public safety, public telecommunications, like cellular, which is really voice, data, fax, image, and ultimately video multi-media; and then we also support the special applications that can be used by many people at a zero cost, whether that is the individuals in a opera house listening to that sound; there can be shared applications there, but the equipment has to be designed in a way to defend itself against the other users. So there is no one answer; there are really at least two groups of answers that I think the Commission deals with as the highly reliable, dedicated, exclusive-use allocations, and then these other

competing-use applications where you have a protocol and a style to your operation.

COMMISSIONER CHONG: Thank you. I will now hand the questioning over to the Chairman.

CHAIRMAN HUNDT: I will try to use the next 12 minutes, then from 12:00 to 12:20, we will have the verbal free for all, and then we will have lunch. Is that suitable?

A number of months ago, when we were working very hard to prepare the PCS auction, I picked up Fortune magazine, which I read religiously, and I found that there was an article in that magazine by George Gilder, who is a friend and I think this is someone who we all ought to pay attention to, and is a brilliant writer, but the headline of this article was, "Stop the Auction." Now, George is also your best publicist in the world, so you know I am going to get around to you eventually here. He said, "Stop the auction. Stop the madness at the FCC. Stop them before they kill economic growth again. Don't let them do this because we don't need exclusive licenses anymore, and only fools would pay money for spectrum in order to have the right to use it exclusively." We are now north of $15 billion worth of this foolishness in our auctions, so, John Battin of Motorola, was George right or wrong, and what did

you do when you read that article?

MR. BATTIN: Fortunately or unfortunately, whenever George writes an article, I usually get about 12 copies of it from the CEO and many other people around the company with scribbled notes that say, "What is this all about?" I think George starts out with a very basic premise, and, as I mentioned before, I think he extends that to where he not only comes up with a startling but wrong conclusion. Digital technology is not going to do what he says it is going to do; in fact, you know, at least in the foreseeable future, it probably will mean that there will be a less dynamic range and there is more reason to do some partitioning of systems than we have ever have now.

So I think he started out with undeniable facts as to what is going on with bit rates and computers and things like that but, I think -- I take the same data and come out with a reverse answer.

CHAIRMAN HUNDT: Now, in true Washington fashion, I would like to know whether you agree or disagree with George Gilder --

MR. BATTIN: Oh, I disagree.

CHAIRMAN HUNDT: Not you, John. I've got you nailed down.

MR. BATTIN: Okay.

CHAIRMAN HUNDT: I want to ask each of the panelists, Do you agree with George Gilder or agree with John Battin? Paul Baran?

MR. BARAN: Well, I think --

CHAIRMAN HUNDT: Gilder or Battin? Gilder or Battin, Paul?

MR. BARAN: I pass. Gilder.

CHAIRMAN HUNDT: Gilder. You are a Gilder. Reitmeier?

MR. REITMEIER: Battin.

CHAIRMAN HUNDT: Mr. Robinson?

MR. ROBINSON: I'll pass.

CHAIRMAN HUNDT: You pass. Mr. Farrill?

MR. FARRILL: John Battin.

CHAIRMAN HUNDT: John Battin. So that is, Mr. Battin, you voted for yourself, so that is three Battins and one Gilder so far. Karen Peltz Strauss?

MS. STRAUSS: John Battin.

CHAIRMAN HUNDT: Battin. Dr. Ku?

DR. KU: Battin.

CHAIRMAN HUNDT: And, Dr. Steinbrecker?

DR. STEINBRECKER: I go along with Gilder.

CHAIRMAN HUNDT: Since you are bringing up the rear here and you have obviously cast your vote with the

minority view, we should give you a chance to explain your position.

MR. STEINBRECKER: Well, I don't think George was responsible for that piece that said, "Stop the Auction." I think --

CHAIRMAN HUNDT: Just because it had his byline on it? I feel the same way about a lot of things that I say.

MR. STEINBRECKER: But addressing just a couple of points, one, the dynamic range issue is solvable. We have the technology to meet the dynamic range requirements for broadband-to-RF digital conversion, and the point that was being made in that article is that we have been smart enough to manage communications on networks, and we handle a lot more communications on networks. We do not have a Federal Communications Commission managing how we allocate band width on networks. And it is logical to extend that concept into spectrum.

We have a group at MIT, in Professor Durtuso's office, that has started a project called Spectrum Ware. And the idea of Spectrum Ware is that the bandwidth of the network is converted directly into bandwidth of the spectrum, and the spectrum is managed in the same way that we manage what is going on in the networks.

So we think of the spectrum as the logical extension of

network concepts. And I believe what George was saying is that, in concert with that, if we think about spectrum as being allocated to things that move, in other words, for mobile use, and we do not use spectrum for point-to-point communications because there are many more efficient ways and better ways to use for point-to-point communications, that we would have adequate spectrum and that we should allow that to evolve at least in some parts of the spectrum where it is possible for an opening of the spectrum to uses similar to what is going on in the network side, in other words, the explosion that we see there.

CHAIRMAN HUNDT: When you say the dynamic range problem is solvable, do I understand you to be saying that you believe that at some point in the future, commercially feasible products using that dynamic range technology will be available for the transmission and reception of voice, video, and data?

MR. STEINBRECKER: Well, they are today. I mean, we solved that particular problem. With adequate dynamic range to meet the requirements, for example, in the cellular bands, most of the technology that my company produces is full-band receivers and transmitters. We take in the whole band and convert it all to digital and then process it in the digital domain. Similarly, we build the transmit signal

in the digital domain and then convert it to RF and transmit it in the full band. So we manage the band in much the same way it is managed in the networking world.

We have adequate dynamic range to meet the needs in this country in the cellular bands today.

CHAIRMAN HUNDT: So, Mr. Battin, are you persuaded to abandon your anti-Gilder sentiments?

MR. BATTIN: No. I think that he basically just agreed with me.

CHAIRMAN HUNDT: Could you explain that, so we call can grasp why that was agreement?

MR. BATTIN: You can apply digital technology reasonably well in a well-controlled cellular environment, but if in his cellular environment let me put one of my big paging transmitters right in the middle of that or park an FM broadcast station right in the middle of that, then you have a problem. That was my point.

CHAIRMAN HUNDT: Would you like to pick your ally here? Their hands are going up.

MR. BARAN: I think we agree from the outset that if we have a band, we are going to have limits on either watts per power or watts per hertz, so we do not have that crazy situation of a pager messing up not only anything near it, but everything within hailing distance.

CHAIRMAN HUNDT: Don, do I understand -- would you be comfortable with at least broad designations of bands limited by watts per power or watts per hertz?

MR. STEINBRECKER: Yes, yes. I think the cellular concept extended is more or less ideal of spectrum management. I would just like to mention to John that his device there, he needs bandwidth for it, but he only needs it in the local cell. Once it is inside the cell, then over the network, we have adequate bandwidth and we always will have.

CHAIRMAN HUNDT: We can come back to this in the free for all. I have one other topic that I want to address today during the Q&A part, and that is the question of interference from various wireless equipment with existing products that are in the marketplace to serve the needs of the disabled community. And, specifically, I would like to inquire into the panel's thoughts about the possibility of interference between the new wireless technologies and hearing aids.

Let me let Karen Peltz Strauss offer very brief comments, in the interest of time, and then I am going to ask a number of others of you to offer your views.

MS. STRAUSS: Well, I think you have already summarized the problem, and the problem is that there are

certain wireless products that have been put on the market that unfortunately interfere with the use of hearing aids by causing these hearing aids to emit a -- or actually by emitting a very high-pitched sound. It is very annoying to people who use hearing aids. It is also, unfortunately, interfering with people that use hearing aids that are not even using a telephone. So there is a double problem. There is a bystander interference problem and there is a user interference problem.

In addition, most of the digital wireless telephones are not hearing-aid compatible. We are obviously concerned about this issue. The Commission recently completed a negotiating rule-making to ensure that wire line telephones are hearing-aid compatible, and that was a very successful proceeding, and we are in the midst right now of ongoing efforts to work with industry to develop a solution to the wireless problem.

This is, I think, one example of where we think the Commission can assist us to a tremendous degree. We feel that in the licensing of spectrum, there should be requirements that require entities that receive licenses to ensure that their products are accessible to people with disabilities.

And, if I could just take this opportunity, I want to

thank the Commission for establishing a Disability Issues Task Force. This is really the first Commission that has truly dedicated itself to addressing the needs of people with disabilities. I have worked in this area now for about 15 years and have gone through various proceedings, and it is really a pleasure to work with this Commission and see its dedication and commitment to meeting the needs of people with disabilities.

CHAIRMAN HUNDT: You are nice to say so, but let me also acknowledge that Congress, in the new law, both Houses, in a bipartisan way, supported some very fine language with respect to giving the Commission a mandate and some powers to try to keep on in this particular direction.

Let me ask Craig Farrill to respond to you, if I might.

MR. FARRILL: In the cellular industry, there is quite an active activity at this point to pursue research into which units have an effect and which do not. It is, I think, probably one of the most important things we look at, as a Commission role, is this role of interference management not only between and among carriers, but between radio systems and other devices, between radio systems and people, -- we obviously don't want to interfere with the human beings that use them either, and other things of that nature.

We are active within the code-division/multiple- access area where we do have a specific solution for this, both bystander and local user. The analog systems that are currently fielded, we have seen very little effect, and so we are working with code-division/multiple-access technology and the hearing-aid community to see if we can identify a way to solve that problem. It has a great deal to do with the power, and it always gets back to that. These bits have power so, it is a bit is a bit is a bit, but a bit with very high power is different than a low-power bit.

CHAIRMAN HUNDT: Let me acknowledge that the industry has been very responsive, and these discussions are going well, but to a point on this, I would like to ask a couple of you to play Commissioner for a moment and answer, very briefly, the following question. So if you were running the FCC, what would you do about this particular issue? It is stipulated that there is some level of interference, we have at least three sectors involved -- the hearing aid community, the people who make the hearing aid equipment, and the people cause the devices to be in the marketplace, which caused the interference -- in a nutshell, what would you do, Don?

MR. STEINBRECKER: Well, it should be possible to prevent that interference. I mean, there is probably no

good reason for it other than in a technological-design sense, and, I suspect what is happening is you have rectification of the modulation on the signals that is causing this particular --

CHAIRMAN HUNDT: Would you have us pass rules that require solutions? What would you have us do, that is all I -- in a nutshell, what would you have us do?

MR. STEINBRECKER: Well, I mean, one would expect that you would require that that interference does not occur.

CHAIRMAN HUNDT: Dr. Ku?

DR. KU: Yeah. I think maybe some kind of a specification on the amount of interference that can be tolerated could be done, and let me mention that for Craig's side, that for CDMA, there are a number of adaptive interference-suppression or reduction techniques that can be used, and this is driven, actually, by the tremendous advancement in DSP -- chips, and examples of that would be adaptive equalization and echo transfer, and I don't know exactly what interference problem. I think some of the more advanced adaptive interference-reduction techniques can be used.

CHAIRMAN HUNDT: Just, in a nutshell, Gene Robinson?

MR. ROBINSON: Well, that is a fairly difficult problem because you regulate the emissions quite well with the various rules and so forth; however, there are people that can build devices and sell them to the consumers with no regulation as to what kind of suppression or immunity to interference they should have, and I think that, for instance, the hearing aid device is a communications device, I would look closely to see if it might be in the spectrum that you have responsibility for.

CHAIRMAN HUNDT: Glenn?

MR. REITMEIER: Establish an advisory committee composed of hearing aid manufacturers and transmitter manufacturers to see if they can adopt recommendations for both emissions and immunity and follow their recommendations.

CHAIRMAN HUNDT: John?

MR. BATTIN: It is basically the same issue as why sometimes telephones make strange sounds and why your stereo talks like a police department. When they build the equipment, they do not put enough RF bypassing, etcetera, in, and you get interference problems. I do not think it is a great big problem to solve; the problem to solve is the thousands and thousands of units that are existing in the field that would be the problem.

CHAIRMAN HUNDT: And the last advisor on this particular issue, Paul?

MR. BARAN: Well, I think it is one of the cases where you have a balance problem there. The people that design hearing aids try to make them as small as possible and as simple as possible, and they do not optimize noise suppression. They can't in their small space, so it is a balance of how much give do you want to take there.

CHAIRMAN HUNDT: Very useful guidance. I think we now begin the free for all period. A very decorous but vigorous debate is expected from everyone. I have a question. Donald, what is the most illogical and inaccurate statement that you have heard, excluding anything said by a Commissioner?

MR. STEINBRECKER: Well, I am going to -- I do not know if I can answer that. But I do think that we are looking at a new era here in terms of spectrum, and we are looking at it more from the network side than from the older radio side and the extension into the spectrum of the networking concepts, with the Spectrum Ware project at MIT. And I should also mention that at USB, we have set up a wireless center there devoted specifically to broadband interfacing with networks, wireless-broadband-wireless interfacing with networks.

I should also mention, for your benefit, that at the MIT media lab there is a group working on what is called a "body net," and they have now learned that you can transmit up to 100 kilobits per second over your skin. This leaves open the possibility of putting a mouse on the back of a ring, you know, so you could use a mouse in this way or having other things, like hearing aids and other parts, integrated into a wearable computing environment that would be tied in by this wireless extension of the network into the Internet and beyond. And this offers the possibility for a wide variety of different aids to people in many different ways that we cannot do today just by extending the networking concept to the body net.

CHAIRMAN HUNDT: Very good. Would anyone else like to respond to the request for a rebuttable of the most objectionable thing said so far? Karen?

MS. STRAUSS: I actually do have one, although I could dig back into the first panel for a minute. The comment that the marketplace will handle everything, that the marketplace will be sufficient to meet the needs of the consumers; that has never worked for people with disabilities, obviously. The telephone is the best example of that. From the early century, people with hearing impairment, hearing loss, did not have access to the

telephone.

On the other hand, when Congress or the FCC takes that step forward and mandates accessibility, in turn, it becomes more access for everybody, and the decoder chip built into television sets over 13 inches is probably the best example of that. I frequently use the example of how I use the television with the captions almost every night when I am in my bedroom because my children's bedroom is nearby, and I do not want them to overhear the television. There are a multitude of uses for captioning and the NOI on captioning, I'm sure, will gather more uses of that.

But, basically, the concern is that you had asked at one point to which consumers do we look, or to which customers does the marketplace look? And, typically, the marketplace looks at affluent, well-educated, non-disabled individuals, and it does not look at all the sectors of the population.

CHAIRMAN HUNDT: And, Glenn, I think you were going to jump into this breach.

MR. REITMEIER: Yes, thank you, Mr. Chairman. I would just like to assert that in digital communications dynamic range is hardly ever the limiting factor. I mean, from an academic point of view, that is nice to think about, but, frankly, the real world, as the hearing-aid example so

vividly illustrates, is that communication systems, wireless ones in particular, are interference limited.

CHAIRMAN HUNDT: I would like to next throw the following question out. The word "efficiency" has been used by probably all of you. Is there anyone who would like to explain to the rest of us your own particular view of the meaning of the word "efficiency"? If there are no volunteers, I will call on somebody. John Battin?

MR. BATTIN: I think if you were to take a picture of all of the radio frequencies at any given time and see what is going on, you would see vast numbers of frequencies with nothing happening. You know, it is either between words, no transmissions, waiting for something to happen. You know, so if I were to, you know, academically, I would say you could look at spectrum almost on a time-and-frequency basis, you know, and you really have not used that spectrum until you could almost look at every hertz and find activity to some level and --

CHAIRMAN HUNDT: Does efficiency mean, then, that something is being transmitted, some wave is occupying that particular place in the RF chart?

MR. BATTIN: At that particular time. That is what happens, in fact, in CVMA. One of the reasons you get a lot of efficiency is because you do not use the spectrum

unless you happen to be talking.

CHAIRMAN HUNDT: Okay. Does anyone agree or disagree with that definition?

MR. BARAN: Well, yes and no. You can take a radio and tune it across the band and you will see certain bands without anything on there at all, except an occasional strong signal. And we have another case where energy is uniform across each frequency. We do not know if the second case is efficient or not, but we do know the first one is inefficient, from information theory. Now, we can just look at that spectrum and say, "Hey, that's not being used well."

CHAIRMAN HUNDT: Any other agreement or disagreement with that definition? Gene?

MR. ROBINSON: I think you have to be careful when you apply definitions of efficiencies because there is a balance that has to be achieved. Certainly, some approaches can be very, very low cost and inexpensive but use very wide amounts of spectrum. So you have to balance the spectrum efficiency and the use of that spectrum to the application and look at the services that are being provided and what is affordable. And I think you have to apply the technology very, very carefully. You can come to the point where you just apply technology to pack as much into the spectrum as you can possibly get in there. There may not be much use of

the spectrum because nobody would be able to afford it. So there is a fine balance to be achieved there.

Digital certainly offers the opportunity to maximize the efficiency and minimize the cost. In the last ten to 15 years, if you look at the cost of the digital revolution that has been occurring and the benefits derived from that, it certainly tells us that applying that into the RF spectrum should yield greater efficiencies, better use of those frequencies through more applications fitting in, and lower cost.

CHAIRMAN HUNDT: Suppose Commissioner Barrett and I were to, by miracle, were to inherit jointly an abandoned meat-packing plant in downtown Chicago.

COMMISSIONER BARRETT: We do not have a downtown Chicago meat-packing plant anymore.

CHAIRMAN HUNDT: Well, I said it was a miracle. And we were to go out there and say, "Well, this isn't being used efficiently because nothing is happening; no one is using it." So we would get it up and underway, and 24 hours a day we would be running a meat-packing plant in downtown Chicago. Would that be an efficient use of that real estate? Does anyone think that that would be an efficient use of that real estate? It does not sound too efficient in downtown Chicago.

MR. BARAN: We can't talk about efficiency, but we can talk about known inefficiency.

CHAIRMAN HUNDT: Is there not some other issue involving efficiency than just using the spectrum?

MR. BARAN: There is a major one and I think it has not come out yet; in our concept of spectrum utilization, that almost all the networks we have are not just radio; they are a combination of terrestrial networks plus radio tails. As we decrease the range, the power and range of these tails, we increase the number of users we can have by the square. So as we look for efficiency here, we shouldn't think of just the radio portion, but the composite network comprising wire, cable, fiber, whatever, plus radio parts to seek an economic balance to serve the most people with a constrained bandwidth.

CHAIRMAN HUNDT: Craig?

MR. FARRILL: Yes. I was thinking there are at least three aspects, and I think is what you are -- at least part of what you are driving at. There is an economic efficiency with which you operate your meat-packing plant, there is a real estate efficiency with which you do it, and there is a throughput or transmission efficiency with which you are able to move the product through the facility. So the economic is the investment facility, how well you use

your investment.

So there are at least three dimensions that makes it very difficult for us to answer on a singular basis because that is how we would look at a wireless enterprise. You know, does it have the ability to transmit reliably, does it have the ability to operate economically, and does it have the ability to improve the spectrum efficiency over time?

We never imagined we could squeeze as many cellular users into the band we had. Our original estimates for Los Angeles were 100,000 users. We went through that after two years. We are heading toward the million mark now, and that is a very good thing, and the technology has helped us get there. But there is one very important thing, as Karen said. The market forces have been part of that, but there are other dimensions that really belong here at the Commission that set the structure, and I will take your meat-packing plant as an example.

If the meat-packing plant had no access or if it had interference from its neighbors or if it had unusable air, it would not be the same meat-packing plant. And, there are many other conditions when we think about radio systems -- interference from other users, health issues, fraud, eavesdropping, incompatible handsets -- all lead to areas that are not solved by marketplace forces. They are only

solved by an agreement of standardization that says we have got to make these things work well for the American people.

CHAIRMAN HUNDT: But, Craig, isn't it a concern also if this meat-packing plant were, in fact, some assigned spectrum, in order to sell that out and convert it to an office building where Andy and I could really make some money, we would have to get some lawyers and lobbyists to persuade the Commission to change the rules so that we were not restricted to this use of a meat-packing in downtown Chicago? Doesn't that have something to do with efficiency and with all the meanings of efficiency that you all have been describing? Can I get a comment from you?

MR. STEINBRECKER: I tend to be on the side that says that efficiency is more of matching the use of the pathway to the end user, and, on a network side, we are improving efficiencies everyday by introducing things like virtual computers, using programs like Java and other things that essentially make you feel as though you have a computer with a hard drive and everything else, but it is just a software; it is essentially a virtual computer.

In a sense, if you move closer and closer to the person that is using the information -- I'm sitting here. I'm probably receiving -- what is it? -- 500 television channels and all this broadcast stuff, I am not using anything of it.

I have heard several people say that an individual assimilates about 20 bits per second. That is really a pretty small -- I do not necessarily buy that, but --

CHAIRMAN HUNDT: You cannot prove that on me.

MR. STEINBRECKER: -- but as you move closer and closer to the individual, you really do not need a lot of bandwidth or a lot of information flow. So if you can match the spectrum use and cause the individual to pull the information rather than pushing it out from the back end, then you get much more efficient use of the spectrum.

CHAIRMAN HUNDT: The model you are talking about would require us to have a very hands-off attitude here at the government, wouldn't we?

MR. STEINBRECKER: Well, Admiral Tuttle has taken this view with the Navy, and he has introduced the Copernicus program, which has now been operating in the Navy for sometime, where information flow is controlled by the user, and he receives it where he is, in whatever form he can use it most effectively, I believe is the term for their Copernicus. But, yes, to some extent.

CHAIRMAN HUNDT: Gene, I think you are getting the last comment here.

MR. ROBINSON: I would like to bring us back around to what might maximize efficiency and the definition

of efficiency and so forth from the standpoint of the use of auctions. There is a limited amount of spectrum available, even as we go to higher and higher frequencies, and there will be it seems like an unlimited number of new applications that will want to fit into those spectrums; and to resolve those, we could go work on the maximum efficiency use of the spectrum by trying to promote sharing, get the number of bits per hertz in there packed to what theoretical limits would allow us to have it, use exotic coding and modulations schemes.

But one of the more efficient ways of making sure that we use the law of physics accordingly and not try to violate them is to promote those things, but to also consider that it is a limited commodity. There is not ever going to be enough spectrum available to serve all the applications and so forth. And then you have to get back to the marketplace and say, "What is the most efficient use for the benefit of the public of which we all should be serving and for our nation and our country and people that live here day to day? How do we best make use of that spectrum?" And it comes down to what is the willingness to be able to buy or purchase that spectrum through auctions; and through that process, I think the technology will be pulled to serve the most efficient use, and it will promote technology to be

able to channel the applications and information through those pipelines which are purchased because there will not be anything less than that acceptable.

CHAIRMAN HUNDT: Very fine. Commissioner Barrett?

COMMISSIONER BARRETT: Thank you, Mr. Chairman. I am not sure if -- do any of the Commissioners have any questions?

COMMISSIONER NESS: Not a question, but just a comment; and that is we have an opportunity today to see some of the applications that we have been talking about, some of the more advanced approaches to spectrum use; and for those who have not had an opportunity to go across the street to 1000 M Street, I do recommend a visit there to see some of the ideas that have taken place. Some of the equipment, for example, can transmit pictures, transmit fingerprints, mug shots at five kilohertz of spectrum in the 200 band, and there are a number of applications there equally exciting. So additional food for thought for those that do not want to use the entire lunch period for food.

COMMISSIONER BARRETT: Mr. Chairman, I want to thank you, Commissioner Ness, and Commissioner Chong. And, certainly, the Chairman told me not to go across the street because they may have a matching mug shot and fingerprint over there, so that is the reason I have not been. But I do

want to take the opportunity to thank this panel and certainly the first panel, and certainly you have enlightened us in the terms of the technological trends, and we will reconvene at 1:30 p.m.

CHAIRMAN HUNDT: Thank you.

(Whereupon, at 12:24 p.m., the hearing was recessed, to reconvene this same day at 1:38 p.m.)

A F T E R N O O N S E S S I O N

(1:38 p.m.)

COMMISSIONER NESS: I wanted to welcome everyone to this afternoon's discussion on Spectrum En Banc. If you came into the room and you do not know what this is all about, we are looking at spectrum. We also want to appreciate the very thoughtful submissions that this panel has made in preparation for today as well as obviously the people that have preceded you and the panel that will follow you. I certainly, from my own perspective, I found these submissions to be extremely helpful in formulating my thoughts in preparation for today but also in terms of looking at these issues going forward so, thank you.

The subject of Panel Three is spectrum allocation and we will be looking at several specific issues; how much flexibility we should provide? What is meant by flexibility? How we can better allocate or zone spectrum. Exactly how we should apply market based approaches to our deliberations. Is the way we categorize radio services, is that appropriate? What ought the role of international decisions be in our policy decisions at the Commission?

To begin, what I would like is if each of you could take just 30 seconds, it is condensed time, this is digital, 30 seconds to tell us, first of all, give your names and

then secondly, tell us what main point you would like us to walk away with. I know that is a challenge but you are all up to the challenge and if I could begin with Larsh Johnson, please?

MR. JOHNSON: Yes. Larsh Johnson, founder and Chief Technical Officer of Cellnet Data Systems. We provide wireless data services primarily to the utility industry and utilize both exclusive use licensed frequencies as well as non-exclusive use, unlicensed radio services. And, I think the main point would be to distinguish between the characteristics of allocation of both types of frequencies and to try to be focusing on spectrum efficiency in both kinds of radio services.

COMMISSIONER NESS: Peter Pitsch?

MR. PITSCH: Thank you, Commissioner. My name is Peter Pitsch. I am representing the Progress and Freedom Foundation. As I am sure many of you know, I frittered away my youth thinking about these problems in the 80s and my main recommendation is that the Commission adopt market based mechanisms to manage most of the, or bulk of the spectrum.

COMMISSIONER NESS: Okay. John Stupka?

MR. STUPKA: John Stupka. I am Senior Vice President, Strategic Planning for SBC Communications and we

are involved in most forms of communications in entertainment today. The main point I would like to bring up during this panel on spectrum allocation is the fact that when the FCC makes an allocation, that it has a clear understanding of why it is doing it and that it is communicated to others and that the methods follow the intent of the allocation.

COMMISSIONER NESS: Lon Levin?

MR. LEVIN: Hell, my name is Lon Levin. I am Vice President of American Mobile Satellite Corporation. I am also on the Board of Directors of the Satellite Industry Association. And today I would like to leave you with one point and that is that satellites are unique; they are inherently international and decisions made here in the United States affect the entire world.

COMMISSIONER NESS: Charla Rath?

MS. RATH: My name is Charla Rath and I am with Freedom Technologies, a consulting firm here in town and my interest in this subject area stems from my time in the federal government as well, both at NTIA and the FCC and I guess, you know, what I would want to say here would add on to several things that were said earlier this morning but, briefly, is that spectrum scarcity is really the reason why the Commission regulates spectrum but, at the same time, the

irony is is that, in fact, certain things that the Commission does, in fact, cause spectrum scarcity. And, it is that that I would like to leave behind with you to think about.

COMMISSIONER NESS: Charles Jackson?

MR. JACKSON: Hi, my name is Chuck Jackson. I am a consultant. I think my main point is that while markets are important and market tools are important in spectrum management, they are not the only solution; they are not the solution for every spectrum allocation issue. You must strike a balance, a balance between market techniques and other techniques in managing the spectrum.

COMMISSIONER NESS: Okay. Mr. Amarosa?

MR. AMAROSA: My name is Michael Amarosa. I am the Deputy Commissioner for Technological Development for the New York City Police Department and I am here today representing APSCO. The two things I would like to leave you with are that public safety's need for more and additional spectrum as well as some form of allocation that takes into account public safety's position, both from an economic point of view and from a public safety protection point of view.

COMMISSIONER NESS: Donald Norman?

MR. NORMAN: I am Donald Norman from Apple

Computer. I am Vice President of Advanced Technology, which means the research division of Apple Computer. My major point is that unlicensed spectrum opens the door to those with no money but with great need. It lets the small business person, the inventor, the entrepreneur, schools and small communities enter into the wireless world, the NII. It meets innovation and novel uses, things that we do not even think about today.

COMMISSIONER NESS: Thank you. Henry Cauthen?

MR. CAUTHEN: Thank you. I am Henry Cauthen. I am President of the South Carolina Educational Television Network and I am representing America's public television stations, which is a big task. My primary mission, I should alert you up front, I do have a bias and my bias is towards the children of this country. If we cannot set aside enough spectrum to allow us to provide a good educational opportunity to the children of the country, as well as the adults of the country, because as we look at the complexity of what is happening right now in the world and these hearings today, if we do not have an educated populace, they are not going to be able to function in this new environment. And, public broadcasting can play a very important part of that. I wanted to spare you of the idea that public broadcasting is only broadcasting because it

does many, many things beyond that; it uses virtually every area of the spectrum that you deal with. In South Carolina, broadcasting --

COMMISSIONER NESS: Thank you, very much --

MR. CAUTHEN: -- is less than two percent of what we do.

COMMISSIONER NESS: Okay. What I would like to do now is to go through a couple of questions and see if we can get a little bit of back and forth going on. We heard a lot about flexibility this morning. One message seemed to be that PCS struck about the right cord when it came to flexibility. Do you agree or disagree and how would you define flexibility, beginning with Chuck Jackson, please?

MR. JACKSON: Well, I would agree that PCS struck an excellent balance. There is flexibility poses a challenge to the Commission because you have to protect against harmful interference while you want to give decision makers in the field, the producers, the licensees and the consumers the ability to use new technology to experiment, to re-define services and you have the advantage in something like PCS or cellular, very large blocks of spectrum, large in geography, large in bandwidth and if you have rules that protect people at the edges, the PCS rules limited the interference out of region and out of band, then

you can give people lots of flexibility inside their block.

In a different service, in a service like broadcasting, where people basically have more restricted service areas, you have to be more concerned about those effects on their neighbors and it is probably hard to give them equivalent flexibility. With digital broadcasting you can say, you can transmit any kind of bits as long as you want but they cannot all of sudden go from 20 megabits per second to 40 without creating harm.

So I think that flexibility, as long as you protect against interference but try to give the service providers and consumers the ability to mix and match, to make the system serve their needs better, is very worthwhile.

I would also add, I think it is in my written statement, that there are some services, the one that comes to mind most radically, is emergency position beacons, radio beacons, where you do not want flexibility. The service is very well defined for a specific application and it does not make sense to give anyone flexibility. Thank you.

COMMISSIONER NESS: Anyone else want to follow up on the flexibility question? Peter?

MR. PITSCH: Yes, I would. I think the PCS model was a good model but I think going forward the Commission should look to give existing licensees more opportunity to

get flexibility on their own and then consider placing overlay assignments over the spectrum to exhaustively assign it. The reason I think that would be an important improvement over the PCS model is that obviously, in the PCS model, you did force existing users to change use and perhaps, in some occasions, you will know enough about the relative value of the new use to use that model. But I think what the most important goal of spectrum management should be to maximize the value of the spectrum to the American public. And, what we need now are to come up with mechanisms that can move spectrum from lower valued uses to higher valued uses. We need to come up with efficient mechanisms that rely on private incentives and that means we want to tap into all of the existing licensee's incentives to come into the Commission and say, "Yes, we think there is a new, more valued use. We have made arrangements. We have aggregated spectrum. And furthermore, if you overlay assignments on top of our current assignments and auction those off, we will be able to even use this more efficiently." I think we need to start looking to outside the box, to use a phrase that I know one Commissioner has used in the past, to look for mechanisms that will encourage the private sector to do what the Commission has done in the past, which is identifying new important uses.

COMMISSIONER NESS: Okay. Mr. Stupka?

MR. STUPKA: Commissioner Ness, I think the only thing you can so far is so far, so good because you do not have anything on the air yet and when people start taking different tacks and using it narrow, using it broad, using it high power, using it lower power and the actual interference starts, to see what mechanisms have to be put in place to resolve that or how the resolution occurs. Only time is going to tell on that.

COMMISSIONER NESS: Okay. Commissioner Barrett, I think I have grabbed your time.

COMMISSIONER BARRETT: Commissioner Chong.

COMMISSIONER NESS: Commissioner Chong's time? We have been trying to alter things here a little bit to stir up the mix and sometimes when one stirs up the mix, as you were just pointing out, there is a little bit of confusion.

COMMISSIONER CHONG: I wanted to focus for a minute on the international aspects that Mr. Levin raised. Obviously, we do not allocate spectrum in a vacuum, we have to coordinate our allocations with other countries in international fora. So one question I had, we will start with Lon, is how should our international long range planning affect our spectrum policy and after Lon, I would like to know if Mr. Pitsch has a comment, because he is

talking about let us use market forces and that may not be compatible in some ways with the slow pace of international allocations. So I am wondering if you two could interplay a little bit and anyone else that wants to join in the fray?

MR. LEVIN: Without getting into the market based allocation issue, first let me make the observation that at this point, the United States is truly the leader in the world when it comes to allocations and, at this point, what the United States decides to do does affect the rest of the world and typically, how it is worked, particularly with satellites, is that the United States has come up with various ideas on how to use the satellite spectrum and then we have brought it to the world. The world appears to be responsive, generally speaking, to U.S. interests and the world has also, as we organize ourselves with the ITU, to quickly respond to new ideas.

In 1992, the ITU structured itself and now has conferences every two years. As a result of that, I think it is to the United States' advantage to keep on coming up with the new ideas that we have, keep on pushing our industries and, I have already said it, I will say it again, the U.S. is the leader and we should continue to take advantage of the ITU structure as it is.

COMMISSIONER CHONG: You know, everybody thinks

their service is special. You are saying that you think satellites are special? Why? Why not other services that could have applications across borders?

MR. LEVIN: Well, in my comments, I was not suggesting that that was unique to satellites but, satellites, particularly in the last decade and a half have dominated ITU conferences. There have been other issues as well, certainly, but the point is is that satellites have been the example but, you are right, there are other services as well that could fit into that paradigm. Satellites is one of them.

COMMISSIONER CHONG: Let us hear from some of the market forces types.

MR. PTISCH: Well, I will be brief. First, when I say flexibility, I mean flexibility as long as you are not interfering with your neighbors and consistent with international treaty obligations that the United States has and second, I think the United States when it negotiates over seas for spectrum should have the same goal that it has domestically, which is to gain access to spectrum that is going to benefit the American public to the greatest extent possibly; not necessarily promote one particular industry or gain spectrum from one particular need.

Now, auction issues aside, which are more difficult, I

think if we gain access to international spectrum and licensees on that spectrum wanted to use terrestrial or mobile or other applications, the Commission ought to consider whether, in fact, here again, they might know at any point in time what in fact the best and highest value use might be. I do not think there are good market failure arguments against allowing that kind of flexibility. I would not, I just want to be clear here, I am not proposing about taking any spectrum away from anyone. That, I think, will be part of the problem; I am sure we will get into this later today. I think if we get into concerns about windfalls and undue enrichment and so on, we are going to delay the process of moving spectrum to its highest and best use for the benefit of the American public.

COMMISSIONER CHONG: Mr. Norman?

MR. NORMAN: I wanted to point out that the United States does not always a deployment of spectrum. So if you take a look at computer networks, for example, especially wireless networks, the Europeans have developed something which they call the high performities local area network or HIPERLAN and we feel it is very important for American computer companies to be able to take advantage of the European advances and essentially allow the market size to lead to lower cost. So if in fact, the U.S. deployed the

same frequency standards as the Europeans did, then we could have a much more efficient market and the Europeans have deployed starting at 5.15 megahertz, which is exactly why we have said we would propose the unlicensed frequency be starting there to be coincident with the European standards.

COMMISSIONER CHONG: Anybody else? Mr. Johnson?

MR. JOHNSON: Yes, I would just like to maybe echo what Peter was saying. I think where it is possible, international standards ought to be followed as new spectrum is allocated. But I think that that probably should take second place to the need to rapidly deploy spectrum and rapidly make it available so that market forces can make it useful to the greatest extent.

COMMISSIONER CHONG: Often, international allocations and the word rapid are not consistent.

MR. JOHNSON: Exactly the point. I think that that is why the concern, I think, that some would have about the time it would take to deploy services based on the formulation of international standards. It is difficult enough to do that within one country or one company, for that matter.

COMMISSIONER CHONG: My next topic is with this flexibility, how will manufacturers know what they should build? I am just going to throw that out if anyone wants to

comment on that. Mr. Johnson?

MR. JOHNSON: Well, I represent a manufacturer and I think it is pretty obvious to us what to build. The market really dictates what our equipment should do. There are certainly questions of compatibility of standards and I think that does tend to have an increasing cost effect on the equipment itself. I think in time, you will see those costs decline as the market chooses a particular technology standard. Early adopters typically pay more for a lot of reasons and one of those may be dual mode equipment. I think there is a lot of advances in technology that have basically provided more and more cost effective ways to be compatible with a number of standards. That is particularly true in the cellular world these days and the PCS world. But I think that that same principle will hold. So I think probably the most challenging thing for manufacturers to determine exactly what their customers want and service that particular need and, to a large extent, the technical standards of interfaces and different spectrum uses are somewhat secondary to understanding what the product and service ought to be in the first place.

MR. AMAROSA: If I may, I look at it from a different point of view. I think that the user should dictate to the manufacturer's what they need. I think we

have to communicate our needs, both in law enforcement and public safety, as to what the objective is that we have in transmitting information to the folks that need it and how we should get it there.

If you look at this morning's discussion about efficiency and effectiveness of the utilization spectrum, that is one of the areas that products have got to really address. They have got to make it so that we can send out officers, we can send out firefighters, we can send out EMS technicians and have them with a piece of equipment that will last the full eight hours of their tour; that will be able to communicate with central; will be able to give them that information and I think Commissioner Ness spoke this morning about fingerprints being transmitted, mug shots, criminal history information, getting that to the officers in the car efficiently and effectively so that we, as customers, as consumers, as the users of these products should dictate to manufacturers exactly what our needs are and have them step to the table and address that and say, this is what we can produce, dip into that R&D bag and come out with the things that are necessary, such as one of the things you saw this morning, the hand held camera.

MR. PITSCH: If I may add, Commissioner, this question really raises the question of the important

economies that might derive from national allocations. It might be easier to set standards, obviously, if one person has a national allocation merchandising other things and I think the Commission gets a lot of credit in the PCS auctions for coming up with a mechanism that allows those kinds of economies to be reflect in the acquisition of initial assignments and that, of course, is simultaneous, multi-run auctions. We saw that in the regional paging or narrow band PCS at the regional licenses, in fact, were aggregated, in some instances, and became national licenses.

To the extent that these manufacturing economies are truly important and could not be derived through contract, I would expect that you would see that solved through simultaneous multi-run auctions.

MS. RATH: I just wanted to add I agree with Peter and I think the Commission already has done things that encourage manufacturers and help them understand where the market might be going and I do think that in PCS right now we are actually seeing some of that play is that, you know, there is a lot of discussion about which standards would be the ultimate standard and we are going to see it play out in the marketplace and the way that people will get nationwide networks will, in fact, be by teaming and joining with other groups that use the same technologies.

What I would just like to mention, though, is the flip side of that. What would you propose in the alternative? Would that before the Commission to set standards, which I think, you know, we have seen in the past that in some cases, maybe for interference standards it might work but, I think, for the most part, technology changes so rapidly that what the Commission needs to do more is to send signals as opposed to literally set standards because the process of coming back to the Commission and getting that change can be -- we were talking about the ITU earlier, that can also be quite burdensome and I think industry has shown that they actually can take this responsibility.

COMMISSIONER CHONG: Now, you say the Commission should send signals; how should we do that? Smoke signals?

MS. RATH: Well, no I think in PCS, I think what Peter said was a good one. You structured an auction that allowed people to go out and get fairly large blocks of spectrum and then really made it very clear that interoperability and things like that roaming were important, you were not going to mandate them but, the market already has said to these manufacturers, this is a very important component of cellular so, I think the feeling was you did not need to mandate that. With other types of services, you might actually want to be, you know, if it is

a very new service, I think broadcasting is a difficult one because you are talking about receivers that are in the hands of consumers and a long period of time where there is a turnover in receiver technology but, even so, I can see where a market, you know, the market should play more of a significant role because the time to change the standard that the Commission adopts is also quite lengthy.

COMMISSIONER CHONG: Mr. Stupka?

MR. STUPKA: We keep talking about how quickly the free marketplace has addressed PCS. Unless I have missed something, there has been no significant innovation in the technologies that are emerging from PCS. They are simply extensions of what happened in cellular. The standards that we are seeing, GSM and CDMA, that they are all technologies based from a standards process, which as a free marketplace extension of an established standardized service, now has something to pivot off of.

It would be interesting to see had there not been the initial standard setting, had there not been the initial economies, if the manufacturer's would have ever made the R&D investments to allow those initial platforms to emerge.

MR. PITSCH: Consider Nextel.

MR. STUPKA: That is a good one to consider.

MR. PITSCH: Six markets, persuaded Motorola to

build equipment. It worked. I mean the basic arrangement of working with a manufacturer based on acquisition of spectrum in six markets, that is fairly impressive.

MR. STUPKA: The passage of time will determine whether that is a success example or not.

COMMISSIONER CHONG: Mr. Levin?

MR. LEVIN: Just very quickly. With regard to satellites, the FCC, I think, has hit it just right. The FCC typically gives broad licenses out, very little standards, and simply says, "We want you to provide mobile satellite services." In some cases, you have to share with others; the companies get together and figure out how to share. In some instances, you say you can use the spectrum exclusively or you have this particular slot exclusively. But then it is up to the manufacturers to figure out how they will use that spectrum and it has worked out rather well to date and, in fact, the satellites show an extraordinary amount in their ability to provide services as a result of being as free as we have been so far.

COMMISSIONER CHONG: Henry?

MR. CAUTHEN: I think sometimes you run into the question of the public sector and the private sector because, in many cases, the needs of the public sector do not as adeptly, as she said, are not met by the private

sector, particularly in things such as law enforcement and medical transmissions of a very specific nature that may not have a profit. Element two of them, the ability to protect the capability of that sort of transmission, I think, is very important.

COMMISSIONER CHONG: Mr. Chairman, I will hand it over to you.

CHAIRMAN HUNDT: Did you want to --

COMMISSIONER NESS: Go ahead.

CHAIRMAN HUNDT: Chuck, you have a point that you make in your statement about how to use economic analysis to help us make some of the difficult calculus' and on page eight you talk about a technical rule that raises industry and consumer cost by $500 million but frees up 10 megahertz of spectrum as an implicit spectrum price of $.20 per megahertz per pop. This looks like a good buy for society. Do you remember this passage?

MR. JACKSON: Yes, I have it right in front of me now.

CHAIRMAN HUNDT: Pardon me?

MR. JACKSON: I have it right in front me now, yes.

CHAIRMAN HUNDT: Okay. Would you be willing to take this passage from the top and make sure it is

translated down into nice suitable, you know, daily conversation type words.

MR. JACKSON: I will give it my best shot and this is thinking about, as I stated in my opening statement and my written statement, I do not think we can use auctions and market mechanisms throughout the spectrum but, we can get some guidance from say the PCS auctions. We saw the PCS auctions A&B, I think, at an average price of something like $.53 per megahertz per pop. Now, if you found a way where you imposed a regulation on an industry that was using spectrum, say in roughly the same area, they had to pay a little bit more on their microwave radios, say it was ENG and they had to buy more expensive antennas and more stable radios but, they could free up 20 megahertz of spectrum at, what was my example? Well, for a billion dollars, that looks like, for society, it is a good buy. Now, if by imposing those rules, you increase one industry's cost by a billion dollars, they obviously are not going to be very happy. But when you net things out for all of society, it looks like you are getting spectrum, the expenditures that that industry is making to free up spectrum are less than the value of the spectrum as elsewhere in the economy. So it is a hint as to how you could reallocate. It is only a hint, it is not the answer but, it is a tool you can use in

analysis and it is a tool we never had before. Until there was successful auctions in this country, we did not know if it made sense to require an industry to spend $10 million to free up 10 megahertz of spectrum or a billion dollars. Well, now we have a pretty good handle on what those kind of costs are and it can be a guide in every area.

CHAIRMAN HUNDT: Would you be able to use this technique, which I recognize you are only saying it is a hint or it is a guideline but, would you be able to use this technique to value spectrum currently allocated for analog and digital broadcast and to make some calculus of what it was worth to society if that spectrum were to be devoted to any purpose as opposed to the defined purposes?

MR. JACKSON: Well, I have not tried to do exactly that. I mean, obviously, you can run through hypotheticals. If say we have the transition to digital and at the end of the transition you turn off the analog, repack the digital into a fraction of the UHF and free up, depend on who you talk to, somewhere between and maybe 200 megahertz of spectrum, this gives you an idea of what that 200 megahertz of spectrum is going to be worth and you can compare that value with the cost of that repacking and try to determine whether it is worth doing.

CHAIRMAN HUNDT: Now, Peter Pitsch, aspiring to

quote accurately from your original statement, you said, "The over arching goal in managing the electromagnetic spectrum should be to maximize its value to the American people." I do not disagree with that but, I need to make sure that before I conclude that we are in perfect harmony, I understand what you mean by maximize its value to the American people. Could you unpack that phrase? Are you talking about the increase in gross domestic product or the number of jobs or are you allowing for other forms of value to the American people, which might not readily be quantified?

MR. PITSCH: Let me answer that question by saying at the outset that I am not saying that you can use a private property application or system for spectrum in all instances. There are some market failures and so my difference with Chuck Jackson is that I see the flexibility market based approach to spectrum allocation as seven eighths full and I believe he is seeing it one eighth empty and my answer to you, then, is that we need a system that uses market forces to move spectrum to its newest and highest best uses over time for the benefit of consumers generally. There will be some exceptions, there will be some market failures, where a market system would, perhaps, no adequately recognize important interest. I think, as Dr.

Hazlett said this morning, the best way to do that would be to recognize those interests and directly subsidize them. Congress should do that and break any link between the allocation process and the subsidizing of the uses.

As you, yourself, pointed out this morning in a question, not that you necessarily endorse the point but, our national defense system pays market prices for labor and computers. At one time, they did not pay market prices for labor and a study was done and it that showed that they used labor very inefficiently as a result of the fact that they were able to in effect, impose a 50 percent tax on 19 year old men. Well, I think that what we have today is a system that is very inefficient in its use of spectrum and so, what we need to do is focus again and again, in most instances, on how are we going to benefit consumers by getting new services out, more competition, lower prices.

CHAIRMAN HUNDT: I am interested in trying to focus at least a little bit on how the Commission can do its job. The era of big government is over but all I have heard all day is what a big job we have here at the FCC and how everybody would really like us to do the right thing. But what techniques are we supposed to use? What I was trying to get at with Chuck is are there valuation techniques that we can develop so that we can weigh among competing

interests.

Let me ask you, Peter, would agree that there is a value to the American people generated by our definition of certain licenses as only suitable for free over-the-air broadcast? Does that have a value to the American people?

MR. PITSCH: I am skeptical, frankly, and the reason --

CHAIRMAN HUNDT: Wouldn't you agree it has some value?

MR. PITSCH: It has some value but, let me give you --

CHAIRMAN HUNDT: Hang on a second. You say it has some value, all I would like to know is how could we quantify that? How can we, in some way, put a construct on that so that we can compare it to those who would offer competing uses?

MR. PITSCH: In thinking about these problems, when I was at the Commission, back in the '80s, I decided the most important ,and I think your question was hinting at this, the most important questions are how do we get from point A to point B. And, I think the solution to the broadcast dilemma is to give the broadcasters flexibility but, more importantly on the new spectrum, to put it out in overlays so you exhaustively assign the new spectrum and

then, allow people to come in and show you that, in effect, they are not going to diminish the amount of programming available to the American public because if we have that kind of market based approach, they might well be able to use the mechanisms that Chuck is talking about, come in and provide a subsidized wireline access to the very programming that they want to take off and, in the process, we could move, as was mentioned in this morning's panel, from a system where we are using 400 megahertz, provide 20 over-the-air signals and we could do that in one tenth of the spectrum. And, the value to the American public, going back to my goal, the value of freeing up that much spectrum for new digital applications, the benefit in promoting competition, the benefit in promoting new wireless applications would be simply enormous.

So I am not trying to dodge your question but, my answer to your question is, I would be willing to make pragmatic public choice decisions that, in effect, protected the amount of existing over-the-air programming by forcing the proponents of changed use to actually, in effect, make it available through some other mechanism. But given what we know about the efficiencies, it should be abundantly possible.

CHAIRMAN HUNDT: Larsh said on page five in his

statement, "Incumbents should be given service flexibility immediately." So Peter, do you agree or disagree with that?

MR. PITSCH: I believe that they should. I believe you have to have a --

CHAIRMAN HUNDT: So that is an agreement.

MR. PITSCH: Okay.

CHAIRMAN HUNDT: John, do you agree or disagree with that, "All incumbents should be given service flexibility immediately."

MR. STUPKA: It depends what the FCC's intention was of making the spectrum allocation. Let us say that there is a need in this country for --

CHAIRMAN HUNDT: Well, let me interrupt you and say I am sure the notion that Larsh is advocating is that regardless of what our original intention was, they should be given service flexibility immediately and I am just wondering if you think that is a good or a bad thing?

MR. STUPKA: I think that is too general. If I am only allowed answer, I would say it is a bad thing to have that as hard rule.

CHAIRMAN HUNDT: Okay. Lon?

MR. LEVIN: With regard to satellites, certainly flexibility is very important to us but, also the primary services that we were allocating, we want to make sure that

those services can be provided and there is no interference caused to other systems as well. But with these systems, sure.

CHAIRMAN HUNDT: I think he goes on in that same passage and has a caveat that says, "Of course you have to guard against interference." So I would --

MR. JOHNSON: And, I think that is one of the points is the technical standards, I think, continue to provide a great deal of limitation --

CHAIRMAN HUNDT: Right.

MR. JOHNSON: -- current technical standards.

CHAIRMAN HUNDT: So would that make you agree, Charla?

MS. RATH: I agree.

CHAIRMAN HUNDT: Chuck?

MR. JACKSON: I think I tend to agree, yeah.

CHAIRMAN HUNDT: Michael?

MR. AMAROSA: So would I.

CHAIRMAN HUNDT: Donald?

MR. NORMAN: Why not?

CHAIRMAN HUNDT: Henry?

MR. CAUTHEN: Completely.

CHAIRMAN HUNDT: So you would say incumbents should be given service flexibility immediately if it means

that if a PBS licensee converts it spectrum to paging use?

MR. CAUTHEN: I think that there has to be ability of the public broadcasting system to find ways to fund itself; I think we have to use common sense in how we do that. We cannot -- there are limitations, I think, within the public broadcasting system, we all have to work that out ourselves but, I think we need the flexibility in order to do that. It should be in mind with our mission.

CHAIRMAN HUNDT: Yes. Another statement made in Larsh's paper is, "Market based methods can only be used to allocate exclusive use spectrum," I think is the phrase. Is there anyone here who disagrees with that? Is there anyone here who imagines market based methods that could be used with respect to shared spectrum or non-exclusive use? Charla?

MS. RATH: What I would like is a definition of terms, which is something that as I was reading through everyone's discussion on this panel and other panels was what we meant by market based mechanisms. It is not only auctions. I, personally, very firmly believe that flexibility is also a way, transfer ability are also part of creating a good market and in a shared spectrum, you can still have, well, transfer ability is not so much of an issue but, flexibility within some of the things that we

have been talking about with spectrum etiquette. I believe those are very much a part of market principles and are, to the extent that you might not be able to apply auctions, that is one thing but, there are other things that go toward making at least things seem to be operating like a market so, I would actually have to disagree if it includes all of the things that I define as market principles.

CHAIRMAN HUNDT: Do you want to elaborate on your --

MR. JACKSON: I guess I was thinking and more of a general comment on market principles, I think we tend to talk about it a lot as initial spectrum allocation auctions, not the ongoing process of the market and transferring properties between owners and different services and different uses. So my thinking on this point was more that the initial market allocation via an auction mechanism could not properly be applied to shared uses and, I am not able to comment on the satellite sharing because I am not familiar with that piece of things but, certainly in the area of unlicensed services such as unlicensed PCS and some of the above 40 gigahertz allocations. Those are the areas where I do not think auction specifics are appropriate.

CHAIRMAN HUNDT: You know, I think this Commission is second to no other Commission in that we have been very

interested in the international use of satellites and, of course, our international bureau, I think, is something we can all brag about. So, in that context, let me say, Lon, that I still nevertheless repeatedly stumble upon a problem which is that most applicants from the satellite industry for spectrum ask for a lot of spectrum relative to other applicants and how are we supposed to go about making a decision when it is a contest between a proposed international satellite and, for example, a desire to have LNDS spectrum in the United States? It is clearly an apple and orange, clearly two very different business plans. When Paris was asked to give the Greek version of the Oscar to one of the three goddesses, he precipitated the Trojan War. We have these wars constantly here because we do not know how to make these decisions. Auctions would permit us to make these decisions, interservice auctions but, you make some very serious and valid points about the impracticality of auctions when you are dealing with international uses so, how should we do our jobs, other than of course, by smiling benignly on the people who make their claims, what method should we use?

MR. LEVIN: Well, I do encourage you to smile benignly. And, I do want to respond to Larsh's point and the one you raise now and that is, the satellite industry

believes that, if we are talking about market based allocations not assignments of licenses but, if we go to market based mechanisms of allocations, probably satellites would lose more than they would win, if they would ever win at all, and that is because, let me give you the example, you could probably value an MDSS license, perhaps, that is one example of PCS license, much more easily. You could say that New York, Chicago, Boston, whatever, it is a better investment, perhaps, than trying to get spectrum for the entire country, which is what a satellite system has to do, in fact, some satellite systems have to get spectrum for the entire world. So as a result of that, we are concerned to simply put satellites up against terrestrial services. I think the FCC has to make choices. You have to listen to what each industry wants, ask the industries to sit down together and somehow work it among themselves if they can.

As I understand, it is going on in the LNDSS satellite debates. They are, in fact, getting closer. I have checked in, it is rough and tumble but, they are getting closer to some sort of solution.

CHAIRMAN HUNDT: Just, if I can, just one question. If we cannot get agreement among private parties to accommodate each other in the spectrum uses, I have two questions I want to throw out and see if anyone wants to

comment and then I will relinquish the time, the remains for the free for all. First is, should we make our decision as between different applicants based on the one who makes the most persuasive case that they will cause the greatest number of jobs to be created in the American economy?

And, the second question is, can anyone think of any method of charging spectrum fees, which can, in fact, create incentives for more efficient use of spectrum that is not acquired by auction? Any response on either one of those questions? First job, second aren't there spectrum fee techniques that can be used to create incentives to get efficient use of spectrum not acquired by auction?

MR. CAUTHEN: On the first, I think that protecting the public sector can play a major part in creating jobs. For instance, in South Carolina, we have taken the one satellite transponder we have and are putting 32 channels on it, by digitalizing and by uplinking from one location. We are serving all the public schools, all the higher education institutions, the hospitals, law enforcement. We are also serving business and industry allowing the higher education institutions to put MBA programs on-site in industry. Federal and state regulations available immediately in the training rooms in industry. All of this can create jobs. We can prepare the people

coming out of high school for what industry needs when they come out into the work force. This is one of the great problems we have. When they come out of high school, they are not ready. They have to train them themselves. But with the use of technology, we can make our country much more competitive if we preserve enough for the educational purposes that public broadcasting serve.

CHAIRMAN HUNDT: Michael?

MR. AMAROSA: If I just may question your two questions by saying where does that leave us? Where does that leave law enforcement and public safety? Do we create jobs? There is a strong feeling that good police protection, good fire services creates a business atmosphere where people would want to invest in a community. But again, arguing by analogy, arguing by recent additions into areas of certain business. The fee structure, we are not in a deep pocket situation. Government is government, whether it is on that side of the table or this side of the table, we are both fraught with the idea of seeking appropriations and going forward with those appropriations so, I am troubled by the question in the sense of where does it put public safety in the whole game?

CHAIRMAN HUNDT: Good point. Chuck?

MR. JACKSON: That was my point but, he has

already made it, which is, if you give a police department better communications, they may find they need fewer officers or the officers do their job better so that may not translate to job creation but, it may make society better off and so if you just used it as a job creation measure of economic efficiency, you would miss something very important in public safety applications.

I do have one anecdote on placing fees at land-mobile, which arose out of the experience in New Zealand, which was immediately after they basically set up a government regulatory entity in New Zealand, I think in '87 at the time, they made Telecom a -- '86 or '87, the time they made Telecom a state corporation. I think about six months later, the put a fee on land mobile channels of, it was a small amount, per mobile and then they loaded you with a hypothetical loading and they discovered, all of a sudden, there were a lot of people who had lightly loaded channels simply combined channels. And, the problem with that, in efficiency terms, is that they applied that rule in crowded urban areas, and they applied it out where there were nothing but sheep farms and there were plenty of vacant channels. And, as a consequence, they got improved economic efficiency in Wellington but, they got reduced economic efficiency out on the sheep farms.

CHAIRMAN HUNDT: So you need to adjust it on a per megahertz, per pop basis --

MR. JACKSON: Something like that. I mean, a fee, you might be able to calculate a fee that would be quite different in rural and urban areas.

CHAIRMAN HUNDT: It is just a question of factoring in the pops, the density, whatever?

MR. JACKSON: Yes.

CHAIRMAN HUNDT: Lon?

MR. LEVIN: Yes, just to follow up on your question about what are the other ways you can choose is who should get spectrum and your example was, what about creating jobs? Well, part of that is, what jobs are you creating? Is it the aerospace industry? Is it the terrestrial industry? Whatever. The FCC is in the position, and something you should be very proud of, is that the Commission is a critical government agency for the space business today and you have taken that responsibility and run with it better than any other agency and, as far as the United States goes, better than any other government. And, that is a responsibility that you have to factor in when you are making allocation decisions.

MR. JOHNSON: I guess I would just like to note that I think probably the most important thing the

Commission has done to promote spectrum efficiency is to start putting a value on it. I do not think there is anything that can be more important than saying how much is this worth? Our company has developed very narrow band radio technologies in order to get by with less spectrum because we recognize the value and the scarcity of it. Without such incentives, that would not have been done. I think you see the evidence of that throughout.

There is another piece of value, though, that I think is recognized by unlicensed spectrum because I think if we were to look at all the megahertz pops represented by Part 15 devices, I think we would see there is a great deal of value created by a number of those unlicensed applications as well.

So it is important from my perspective, I think, to recognize value both of the licensed frequencies, by placing a value on that spectrum, encouraging spectrum efficient applications as well as equipment and also on the value of unlicensed spectrum because it promotes such a wide variety of different uses, ultimately which are probably even more spectrally efficient than most licensed services.

MR. NORMAN: To follow up on that, one of the ways of causing spectrum efficiency is essentially to put restrictions of what could be done. To use the zoning

regulation story that we heard earlier this morning, if I were told that I had to live in a 200-square-foot apartment, I would make sure that apartment was very, very efficient. If I tell the unlicensed people that they have very low power restrictions and they had other technological restrictions, you can be sure that they are going to make sure that they buy the most efficient services; otherwise, they interfere with each other; otherwise they do not have the bandwidth; they do not get the job done.

So I think here is actually, coming back to coming back to the marketplace argument. The marketplace can act as a powerful force in ensuring efficiency if the appropriate incentives are there.

COMMISSIONER NESS: And those incentives would be set by the Commission, at least in the unlicensed arena --

MR. NORMAN: Well, t they could be very simple techniques. In fact, they could be so simple as simply saying you cannot use more than one watt.

COMMISSIONER NESS: Yes?

MR. CAUTHEN: Just one quick point. In terms of incentive, we have been able to decrease the cost of state government by use of teleconferencing by $45 million each year and our budget is $18 million so, I think that speaks to an efficient use of the spectrum.

COMMISSIONER NESS: But often times does not get recognized.

MR. CAUTHEN: Right.

COMMISSIONER NESS: We talked a little bit earlier about what would happen if you took the, I think Chuck you were mentioning, that if you took the analog spectrum after there had been a conversion to digital for advanced television and you repacked the digital, you would have what had been previously been analog spectrum that would be contiguous and that that would have a certain value and you were very good in sharing one possible formula for a computation of that value. Would, in your view, the value of an interstitial six megahertz be the same as a value per megahertz of 200, let us say, contiguous megahertz of spectrum?

MR. JACKSON: I think not. I think that the interstitial spectrum is limited by the need to protect adjacent analog TV stations, both geographically and frequency adjacent, and that because the spectrum is scattered around and over a fairly wide band, it would be harder for the manufacturing industry to develop products. Maybe they would over a number of years but, conventional products are designed to work in contiguous spectrum. So my view would be that it would be that the spectrum would be

more valuable after repacking and in a contiguous band. I think that makes me an old fogey at this point. There are people with differing views.

COMMISSIONER NESS: Would the spectrum be valued the same if there were a lot of incumbent users scattered about? For example, if we left alone the point to point microwave in the two gigahertz band, would the PCS spectrum be as valuable that way?

MR. JACKSON: I think it would have been far less valuable. That I have looked at with some of the -- I worked on one project assisting a microwave incumbent with understanding the process of dealing with the new PCS entrants and it appeared -- and part of it was a function of the way the channel was set up and everything -- that some of the new PCS entrants were significantly constrained by the existing microwave system. Others were not so constrained. It varied from band to band, and I think that if you had just had to engineer around the existing microwave without the ability to ultimately move these people out at the cost of a comparable system, it would have been far harder to build a PCS business, and consequently the values in the auction would have been far lower.

COMMISSIONER NESS: We talked a little bit about providing service flexibility, and yet we haven't really

totally defined where service flexibility leads off, where allocation flexibility sets in from a marketplace perspective. In the situation where we have, for example, overlays in attempting to get greater efficiency out of the spectrum for overlays, what kinds of rules would one have to impose in order to provide that efficiency? Are there some rules, or should it just be pretty much open to however one wants to use the spectrum? What would be the guiding lights there? Does anyone want to pick that one up? Peter?

MR. PITSCH: I think there need to be rules, but I think the Commission should be focusing on how to encourage this to happen in an expeditious way so that there is a clear line of liability and people can negotiate.

The kinds of ideas that I would recommend would be allowing existing licensees to come in and demonstrate through a showing that their operation, even though they might have a point-to-point license or an antenna license, would protect their implicit service area contour that is implied from their antenna height and their power and other things, and then allow for a mechanism whereby the Commission would allow parties, -- cochannel licensees to object to that or not, and then expeditiously resolve those kinds of disputes, and then allow for the assignment of overlay licenses, as identified by licensees through this

kind of a flexible approach.

COMMISSIONER NESS: How would those antenna heights and powers be determined? What would determine --

MR. PITSCH: Well, the antenna height and power might be in the rules. I am assuming there is no explicit service area --

COMMISSIONER NESS: How would we come about those rules? If this were, for example, total flexibility in allocation, why would we have such rules?

MR. PITSCH: Why would you have such rules? Because --

COMMISSIONER NESS: How would we set them, and what would be the grounds for setting the rules?

MR. PITSCH: One way would be to do what you did in PCS.

COMMISSIONER NESS: All right. Where we determined we wanted a PCS service.

MR. PITSCH: Right, but you wouldn't have to -- it doesn't necessarily follow that you have to boot out the existing licensee. You set a contour, and interference does or doesn't occur at that point. And Chuck may well be right, that the value of the overlay license would be very much reduced if the existing licensee doesn't have to move out, but I think this is such an important point. If the

new use is valuable, then there is room for a mutually beneficial deal to be struck if the Commission does the job of defining a clear line of liability.

Now, if I had my 'druthers, Congress would give you the right to impose binding arbitration and allow someone to come in and say, "Here is my new flexible approach. Here is my implied service contour." No one objects within 30 days. If they do, within 60 days they can invoke binding arbitration, and it's resolved. And they can petition the Commission to do an overlay assignment of all the unassigned spectrum in the area, and the Commission gets it out and auctions it off.

And so then we have immediately imposed a property rights system as identified by licensees out in the marketplace where they think there is the most opportunity to move spectrum to higher value uses. You could impose interference constraints, international treaty obligation constraints. You could even impose broadcasting concerns if you wanted.

But it seems to me, again, to use Commissioner Chong's idea, we really need to be thinking outside the box, and to get to the Chairman's point -- I don't mean to filibuster, but I wouldn't focus on jobs, but I think we all realize that this is an area where the United States has an

enormous comparative advantage. In a five-year period, IBM lost $7 billion in market capitalization because of the creation of the PC industry.

And who here really thinks that the PC industry would have happened that quickly if the companies who made it had to come to any regulatory agency -- I don't mean to pick on the FCC -- to get access to a key input to make it happen? It wouldn't have happened.

COMMISSIONER NESS: One of the things that we have done, in fact, particularly in CMRS, is to look at overlays where we can to provide wide area and flexible use. So we have been certainly moving in the direction of making the system more efficient. But, John, you've run companies that are out there. What is your view on this? Do you agree with what Peter Pitsch has just said?

MR. STUPKA: Well, again, flexibility and restrictions -- I'd rather use terms and conditions. Without terms and conditions, without standards, you can have no overlays. You can't have total flexibility in overlays because by having total flexibility, you have unencumbered use, so there is no longer any tool that the FCC can use to say this is an acceptable contour or this is an acceptable emission, or a tower over this height or a tower over this level is incorrect.

So the answers can be found in neither extreme. If you totally restrict the use, you are not going to attract anything; and if you have it totally flexible, you are not going to get any investment because I will not buy spectrum if I don't know what the terms and conditions are, to use the phrase that Charlie used.

So I think you're going to have to realize that if you want to do the pacing, if you will, then there has to be some compromises between the flexible use and the appropriate standards of emission and other uses.

COMMISSIONER NESS: Chuck?

MR. JACKSON: Yeah. I would like to respond a little bit to what Peter raised there. I see two difficulties with unrestricted use of this overlay concept, and one is that I think we can just see if we look a few blocks away, we see some very narrow office buildings that look like they are about as wide as one townhouse, and we had the problem as originally this neighborhood was full of townhouses, people would aggregate the real estate and then build office buildings on it.

Well, sometimes somebody would hold out, and you would get a less efficient outcome or you wouldn't have a deal for a long time, and if we have, in the CMRS areas where there have been overlay licenses sold, I think it's

been basically to overlay one license at a time, convert a geographic license to a more regional license -- it's not completely true, but it's close -- so you don't have a problem of multiple incumbents that you have to deal with, while if you created licenses that had 10 incumbents in an urban area inside them and you had to do a deal with all of them before you could move into another use, you might find it a very difficult negotiating task.

There is a second problem which didn't occur in most of these services. Certainly, if you think about the PCS case where you have the operational fixed service, a microwave service where one entity controls the transmitter and the receiver, it's easy to understand who you have to deal with because it's -- both ends of the radio link, and it's a defined radio link.

But in broadcasting, it's a little bit more difficult. The coverage that a broadcast station provides is really a function of how much a consumer wants to spend on their antenna, and, you know, you may live well beyond the Grade B contour, but if you happen to be on a hillside and you are willing to put up a 50-foot tower and a good antenna and a preamp, you can get that very distant signal. And it seems to me that a proper social calculus would take into account these consumers that are sort of on the edge

that the broadcaster may not care much about the advertising revenues -- they may only be a quarter of one percent of the total market, of the viewership and perhaps account for even less in terms of advertising contributions, so there interests don't get weighed very heavily in the negotiation between the purchaser of the overlay license and the incumbent.

And yet there is an interest there, there is a benefit that's not being considered, and that's the failure in that mechanism that didn't occur when one person owned both the transmitter and the receiver.

COMMISSIONER NESS: If we were to move to where you have pretty much virgin spectrum, to what extent would the allocation of that spectrum be completely market based, to what extent should there be parameters placed on it, and how would one come about making those decisions? Anyone want to pick up on that question? Lon?

MR. LEVIN: Just very quickly, if there was virgin spectrum and you wanted to see a satellite be put up, I would think that you would have to factor in whether you would want to see satellites go up against terrestrial systems. I've already made that point, but it is the same, the same point, and that is when you put satellites up against terrestrial systems, terrestrial systems probably

will win because of the incredible costs of the satellite systems.

COMMISSIONER NESS: Chuck, you look like you --

MR. JACKSON: Again, I wonder about the interests that Mr. Amarosa represents, and if you have a block of spectrum, it seems to me, from my knowledge of this industry and study and everything, that it would be very appropriate to give some of that to public safety, but a market mechanism is unlikely to do that.

COMMISSIONER NESS: Would a market mechanism also provide for unlicensed service, or would that be something that the Commission would have to basically designate within a zoning context, if you will?

MR. JACKSON: Well, I think it would be very hard for a market to properly account for unlicensed operation. I think it's very valuable and important, and I hope that the Commission does act positively on some of the petitions before it, but I can't see Intel and Apple and Microsoft getting together and bidding for this spectrum, even though it makes it easier to sell computers.

COMMISSIONER NESS: Mr. Johnson, in your testimony, you highlighted the importance of unlicensed spectrum. How would we do that in a totally market-based context for allocation?

MR. JOHNSON: I think that's one area like public safety that probably requires you to say that this spectrum will be allocated on an unlicensed basis. I would start by looking at international harmony and looking where those areas of international compatibility are important and look to make sure that that's the first objective of unlicensed service.

Second, I think that Chuck's approach for valuation could very interestingly be applied to unlicensed service. I have not tried that, but I think it might be interesting to do that. So that might very well give you some guidelines in terms of the percentage of spectrum that would be allocated. But I could see market-based mechanisms in terms of that valuation being applied, although not specifically for a block of buyers as such.

COMMISSIONER NESS: Thank you. I have a question from Commissioner Quello in his absence. In this new world of giving spectrum through a, say, market forces auction type of approach, what kind of interference protection should the Commission seek to ensure for our spectrum users? Do you think, for example, that the Commission ought to continue our role as the interference referee, and to what extent? Anyone want to take a shot at that? Henry?

MR. CAUTHEN: I think the Commission plays a very

important part in that we have no way of predicting what's going to happen with the technology now, and from, of course, my base of serving the public sector, the public sector will not be protected in a situation where this commission or something very much like it does not protect the public interest. I think that's essential. I mean, who can predict what we're going to have ten years from now? A market-based free-for-all there could lead to a totally uncontrolled system in this country.

COMMISSIONER NESS: Mr. Amarosa?

MR. AMAROSA: We need your intervention. We need your intervention to ensure that the regulations are established that permit us to do the things that we have to do. With a market-based mechanism that we are talking about that would generate users that we could not control, you would never know at the far ends of each of the bands who would be on that, and you would have the ability for certain individuals to possibly who don't have the best type of equipment to interfere.

We have had that happen, and we have called upon you on a number of occasions to enforce those regulations for us so we can continue to operate and do the public safety type of things that we have to do. So we need that intervention.

COMMISSIONER NESS: Ms. Rath?

MS. RATH: I would agree that the Commission plays an extremely important role in interference management, but I also think it's interesting to the extent that the Commission would move forward, say, in virgin spectrum and allow greater flexibility to also -- this gets into what I've actually often referred to as "user flexibility," where the user can then work with other adjacent users in the band and actually negotiate some of these rights.

I totally agree that in a public safety environment there are certain environments where the Commission does play an extremely important role, but I also think that it's something for you to consider, you know, sort of that next stage in allowing users to determine more of what they will do with the spectrum, that that might be one aspect.

COMMISSIONER NESS: Now, your scenario talks about adjacent users. What if it's just Joe Blow, consumer, who bought a phone at the Radio Shack? Where does that person go?

MS. RATH: That's actually -- I mean, at this point, I mean, that person goes to the -- really, the recourse is the Commission; or, quite frankly, having worked at the government, where there is an awful a lot of Part 15

devices operating on government spectrum, what generally happens is that as a group they are fairly powerful in their uses of this spectrum. And, in fact, most of the people at NTIA would probably think that there, as an assigned license user, that they are actually at a disadvantage when it comes to dealing with Part 15 device users because there are so many of them. But that's actually an issue of them causing interference to the assigned use as opposed to what you are saying.

COMMISSIONER NESS: Mr. Norman?

MR. NORMAN: Well, actually, that's why we have facetiously proposed a Part 16 rule. You know, this morning it was said that a bit is a bit. I'd like to disagree with that. A bit is not a bit, and a hertz is not a hertz. There are different applications. If I'm doing safety-critical communication with someone, my bit takes priority over all other bits. If I'm sending a picture of my grandchildren, then, in fact, my bit doesn't take priority. It can go in a very different medium.

And the same with a hertz is not a hertz. So for example, in the unlicensed band, this is, indeed, an overlay situation, almost by definition; but we would prefer that in the unlicensed band you regulate very lightly and let the people work it out themselves. You might regulate a limit

on power so that as a result you have only local interference because the signal can only go locally.

You might say that transmissions should be only by packets. And what's nice about that is there is always a breathing space. I send a short packet, and then there is a breathing space for other people to come in. You might say there must be license before transmit, which makes the breathing space work, and that's all. And so in this kind of a domain, we think the people could work it out themselves and simple rules will suffice. Regulate lightly. In other domains, you might want to regulate strongly. A hertz is not a hertz.

COMMISSIONER NESS: That sounds like a song. Mr. Lon?

MR. LON: Just quickly. I know your focus is on domestic interference, but with regard to satellites, certainly we need the FCC. You serve a critical function of coordinating satellite systems with other countries' satellite systems, as well as their terrestrial systems, too. So you will always be in that business.

CHAIRMAN HUNDT: I would like to raise a slightly different topic. Again, using Larsh's excellent statement as a basis for a question, from Larsh, quote, Markets for spectrum should be based on transferable licenses which will

help maintain a true market value over time. Excepting the public-safety case, which I think, Chuck, you've taken a little bit too much advantage of because it's a rather easy argument to make, and I want to confine you here to tougher grounds, you know -- excepting that case, is there anyone here who disagrees with the notion that the licenses we grant should be transferable so as to help maintain a true market value over time? Henry is the only disagreer, so he gets to speak.

MR. CAUTHEN: I think that the investment that has already been made by public television in communities around the country needs to be protected in that regard, and the future use of that sort of service that's been built up over 25 years, even with the changing technology, needs to be protected. And I will go on the public safety issue, too, because I think education needs to be protected in this whole environment, and education is certainly a part of public safety.

CHAIRMAN HUNDT: Let me -- otherwise, we seem to have consensus in favor of Larsh's view here by silence. If Congress were to decide to aware the digital television licenses to today's broadcasters, should Congress also decide to allow those broadcasters to transfer those digital television licenses so as to create and maintain a true

market value over time?

MR. PITSCH: Are we supposed -- a "yes" or could we --

CHAIRMAN HUNDT: Well, you could -- is there anyone who would disagree with that proposition, that Congress should allow them to be transferred? Now, Chuck, you didn't disagree before with this statement.

MR. JACKSON: Well, I would place a condition on it, and this is sort of a lawyer thing, and you're the lawyer and I'm not, but it seems to me that the idea of the digital channel as a transition works only if the digital and the analog stay hooked together. So I would not allow the operator of the digital channel to sell that separately from the associated analog channel. I would want to keep them together because I think that on down the road it would make it easier to affect a transition.

CHAIRMAN HUNDT: You mean you will never get the analog back if you allow the broadcaster to sell the digital license. Is that what you are saying?

MR. JACKSON: No. I didn't say "never." I just -- it might make it --

CHAIRMAN HUNDT: You're creating inherent tension where the analog licensee, having sold his or her birth right, may be reluctant to return the analog license. Is

that what you're suggesting?

MR. JACKSON: It would complicate the equities in a fashion that might not be helpful.

CHAIRMAN HUNDT: Do you feel --

COMMISSIONER NESS: Spoken like a true lawyer.

CHAIRMAN HUNDT: Well, he said I was the lawyer. Do you feel otherwise the analog licensees will be delighted to return those licenses, oh, I don't know, in seven years?

MR. CAUTHEN: I think seven years sounds awfully optimistic to me. I don't think -- I think it's going to take a long time to --

CHAIRMAN HUNDT: Twenty?

MR. CAUTHEN: Oh, within 20, yeah, I think that it would be less than 20, but --

CHAIRMAN HUNDT: So we would have to keep the digital TV and the analog TV licenses coupled for 20 years in order to accommodate the policy that you're outlining. That is what you're saying.

MR. CAUTHEN: Not a full -- it isn't my estimate that it's 20, but I think it would be longer than 10 before you would be comfortable turning off the analog transmission. It's going to depend on how fast consumers buy the sets and the converters.

CHAIRMAN HUNDT: Ten to 20 years of not allowing

free transfer of the digital licenses. I have a refinement of this. As opposed to transferring a license -- and I'm not speaking now about broadcast only; any license -- do any of you believe that we should also allow them to be divisible or partitioned or segmented either by geography or by hertz? Larsh?

MR. JOHNSON: Yes, I clearly do. I think that's one of the key things that would help promote entrepreneurial activity and especially small business development. To the extent that you have nationwide broadband licenses, you can only afford that if you are a big player, and I think that it's important to maintain a market for so divided spectrum such that if an innovative application comes up that can be very efficient, have high value, that that spectrum could be subdivided in order to offer that capability for that new opportunity.

CHAIRMAN HUNDT: John, you might have some experience on this issue.

MR. STUPKA: It's -- I have no problems at all with that concept. Again, what you've got to remember is that if you're wanting to drive people to greater spectral efficiency, if you're telling them that if you can pack it in three and sell the other two, you are free to sell it, if you're trying to provide incentives, I think you've just

stumbled on a very good one.

CHAIRMAN HUNDT: Are you concerned about the following prospect? Someone buys a 30 megahertz PCS license at an auction, and then they proceed over time to subdivide it, both by geography and by megahertz, so that they, in effect, Balkanize the license itself, create hundreds, even thousands of different subdivided properties, all of which are freely transferring in the marketplace. It sounds robust and animated and vigorous and capitalistic and confusing. Does that picture concern you at all?

MR. STUPKA: No, because it's all going to boil down to the mass market and to the consumer, and the consumer is going to do everything in their power to be insulated, isolated, and indifferent to this whole process you're discussing. So the person that has enough mass and has the right technologies to deliver to the consumer what they want, which is the hassle-free access to information and people any time, anywhere, with good quality and at the best price, is going to win.

So I think the initial investment the FCC made in the base cellular allocations is going to provide a protection, if you will, for the consumer and a benchmark for the competitive environment.

CHAIRMAN HUNDT: But somebody who comes into that

kind of fractionated license market and may want to reaggregate the spectrum is going to have to spend a lot of time walking around and buying from Ma and Pa Kettle, all the different farm properties so as to put the theme park footprint together, does that bother you at all?

MR. STUPKA: Either that or they are going to have to work with the technologies to become even more spectrally efficient where they won't have to reaggregate 30; they can do the work of 30 and 10.

CHAIRMAN HUNDT: Of course, that makes the work with the government a much more tangled and time-consuming process, I suppose, in many cases, except for you, Mike, because we are going to take care of you all. Donald?

MR. NORMAN: Well, the problem with your horror scheme is that new technologies may never get off the ground. So take, for example, high-definition TV. If, in fact, the broadcasters can sell off their spectrum into, say, two-megahertz segments, you will never get to high-definition TV, the consumer will never know the difference. The consumer will never be given a chance to choose because they will only be given standard-definition TV as opposed to seeing what, in fact, a large-screen HDTV system would look like.

CHAIRMAN HUNDT: I always wondered about this. If

there is such a demand for high-definition TV, why don't people persuade Hughes or Hubbard to broadcast it from that satellite all over the country?

MR. NORMAN: Well, it's the chicken-and-the-egg problem again. There are no sets, and people won't make sets until there is consumer demand, and you won't have consumer demand until people are transmitting, and people won't transmit -- you've got the point.

CHAIRMAN HUNDT: So they will only make manufacturing equipment when the government tells them it's all right?

MR. NORMAN: No.

CHAIRMAN HUNDT: I thought General Instruments went and talked to TCI and found out how to make these digital downconverter boxes by just working it out between them.

MR. NORMAN: Well, you do remember that you did mandate FM receivers, you did mandate UHF receiving, and that's what, in fact, made the market. It wouldn't have happened without the mandate.

COMMISSIONER NESS: John?

MR. STUPKA: I think this gets us back to the position of whether it's a nascent industry or if it's an established industry. If you have the baseline already, the

decisions tend to be more logical. If the industry hasn't formed yet, if you will, you are never going to get the investment. So I think there is a time when the government has to step in say, we're going to make an investment in this area to try to launch an industry, and then once it is launched, let the marketplace take over.

CHAIRMAN HUNDT: Do you think we should have banned the Beta version of VCRs?

MR. JOHNSON: Or Apple computer?

CHAIRMAN HUNDT: Or maybe, maybe from Apple's perspective, somebody else's computer.

MR. STUPKA: Well, this isn't banning anything. This is nurturing something along standards, and then once the industry is established, you let the marketplace take over.

CHAIRMAN HUNDT: This is "big-mother government" instead of the "big-brother government" here. Aren't there many, many examples in the private sector of manufacturers and content producers working together to figure out how to fit each other's needs without needing the federal commission to supervise it?

MR. STUPKA: Yes.

MR. NORMAN: Well, the difficult here is that the spectrum is a very unique resource.

CHAIRMAN HUNDT: Okay.

MR. PITSCH: I beg to differ. All the resources that they are dealing with are scarce, and a good example of industry agreement are on the new video CDs, the two camps, I'm sure you're familiar with. There are many examples, and many of them are in the computer industry or interoperability and compatibility, and, again, if we had to require standards before we did any of those things, we will still have computers with no hard disks and 64K RAM. I mean, it's hard to imagine how that process would have worked.

MR. STUPKA: Well, let me just do the counterpoint on that. Because there's no standards in the computer industry, per se, you get into a lot of indecision and a lot of hesitancy to have things become pervasive. My wife is a teacher, and they still mark sans grades because there's no standards for the schools on how to input. There's no models for that exchange. And, again, I think what you will find is sometimes the absence of sometimes the absence of standards in areas cause a hesitancy to invest.

So I don't think the answer is going to be found at either of the poles. I think total flexibility will be a disaster and total restriction is a disaster.

CHAIRMAN HUNDT: Charla?

MS. CHONG: And sometimes it's useful when the Commission is in a position of getting the industry to come together to work towards some protocol, some etiquette, some other means, and then have the Commission endorse it in some fashion or at least give it the go-ahead so that it can develop into technology and equipment.

MS. RATH: I just wanted to mention that I was troubled a little bit by the notion that the government should actually determine that a certain group of people should offer high-definition television absent any indication that the market wants it. I think over the long term probably people will want it, but we have any number of outlets now where people continue to choose to offer lower definition television because that seems to be what people are watching and what they are interested in.

I mean, the telephone companies who have had opportunities to build out systems and video platforms and offer this are choosing to go toward more low definition. I, frankly, -- I remember the first time I saw a demonstration several years ago. It was side by side an NTSC that was so crisp and clear, I kept looking at the NTSC saying, Well, when am I going to get this in my house? And I think that's part of it, that I just am very troubled by the idea that somebody in the government would say you must

offer high-definition television rather than suggesting that you allow it to happen and provide some of the fora that people have talked about, the industry fora to help pursue standards and the like.

CHAIRMAN HUNDT: Comment to Charla? Larsh, were you --

MR. JOHNSON: Yeah. Well, just, I think, to respond a little bit to some of John's comments, first of all, I think that you can create the environment that is conducive to high-definition television. That's the kind of sweeping, objective statement you could make as a commission, saying, This is spectrum that we think is suitable for it. Here is an emission mask we think is suitable for it, adjacent channels protected, and so forth, but not require that it's a high-definition television application that is using that spectrum.

And, to that extent, I guess I would agree with John that you can formulate a national investment of that sort by saying, We are allocating something that is suitable for this based on our current knowledge of technical requirements, but to require that, I think, is counter.

COMMISSIONER NESS: Henry?

MR. CAUTHEN: I agree with that statement and what John said, because it doesn't have to be either/or, but if

you keep in place the ability to have that spectrum under one control, it doesn't have to be used for high-definition, obviously. It can be used for variable things until you determine whether high-definition is the way you want to go. But you shouldn't rule it out by dividing it up.

COMMISSIONER NESS: Unfortunately, our constrict is the amount of time, and the amount of time for this panel, unfortunately, has ended. This was very interesting. I know I've personally learned a lot from the discussion here and want to thank all of you for your contributions, both written and oral, to today's discourse. Thank you very much.

(Whereupon, at 3:01 p.m., the panel was concluded and a brief recess was taken.)

PANEL FOUR: SPECTRUM ASSIGNMENT

CHAIRMAN HUNDT: Back on the record at 3:32 p.m. All right. Let's commence. This is the last panel of the day, and like all the other panels, this is the best of the panels. It's a great pleasure that I have in preparing myself to listen to you all. There is a lot of expertise. Why don't we begin in the following way? Moving from left to right, everyone will have 60 seconds to say who they are and anything else they would like to say that fills 60

seconds.

MS. SPENCER: My name is Shelly Spencer. I am here today in my volunteer capacity as a member of the board of directors with American Women in Radio and Television. And, picking up on Commissioner Ness' request to say one point in 30 seconds, I will try to do that. We would like to remind you that the Communications Act, even after the 1996 Act, still has a public interest obligation in assignment of spectrum, and we firmly believe that that public interest obligation includes an obligation to ensure diversity in licensing for women and minorities who are still tremendously underrepresented, both in ownership and employment. So we say, move ahead with that in mind.

MR. BLAKE: My name is John Blake. I'm representing the Association for Maximum Service Television. For 40 years a major focus of its attention and activities has been spectrum management issues. I understand that this is not a hearing on ATV issues, but in deference to my sponsor, I do want to say that in TV, because it is free, the incumbents consist of 98 percent of the American population. Unlike relocating the microwave users for PCS where there were 20,000 incumbents who controlled and owned both the transmitting and the receiving equipment, in the case of over-the-air television you have 1,700 broadcasters

who own the transmitting equipment and 150 to 200 million receivers owned by maybe 100 million households. That's why the ATV channels cannot be auctioned.

CHAIRMAN HUNDT: They can be auctioned; you mean you don't think they ought to be.

MR. BLAKE: Right.

CHAIRMAN HUNDT: I mean, we know how to do it.

COMMISSIONER NESS: Is this the difference between "may" and "can"?

MR. BLAKE: Right.

CHAIRMAN HUNDT: Mark?

MR. CROSBY: Thank you. I'm Mark Crosby, president of the Industrial Telecommunications Association. ITA is an FCC-certified frequency advisory committee. We represent the interests of critical industries. We are having trouble getting a proper moniker for our industries. We are noncommercial, non public safety.

We don't like to use the word "private" anymore, but pipelines, utilities, major people that build and construct the infrastructures that generate benefits for the public welfare, and we're looking forward to discussing today perhaps some alternatives other than competitive bidding that might be suited for our membership.

MR. CAMARILLO: [Too close to microphone.] Good

afternoon. My name is Mateo Camarillo. I am president of ONE, Inc. I have been a small businessman for several years, with the accent over the "small." I have -- since 1981, when I first applied for the first radio station license under the clear channels, applied for -- TV and films under the 8090 docket. I am a participant in the "C" block entrepreneurial small business. There is no accent on the "small." And I am on the board of directors of the National Council of La Raza, and, like Shelly, I'd like to also emphasize the importance -- especially in overseeing the responsibility of the public interest.

MR. HATFIELD: I'm Dave Hatfield, and I am a senior fellow at the Annenberg Washington Program for a few more weeks, at least. Generally, in my remarks I supported the Commission's move towards the use of property rights or quasi-property rights and increased use of marketplace forces in the allocation of spectrum, and I express just three concerns: that the Commission be somewhat cautious and not go too far in deregulating and not protect the property rights that are conveyed and to protect the resource against pollution; I also have a little bit of concern about some of the fragmentation that you talked about in the last panel; and then, third, I am a very strong supporter of the Part 14 or unlicensed services.

MR. GELLER: Henry Geller, Marco Foundation, also Annenberg for a few weeks. I believe that when you are doing spectrum assignment or authorization, that you have found that the competitive hearing and the lottery are stultifying, and since everything in life is compared to what, it seemed to me that when you are doing exclusive licensing, you should generally use auctions or competitive bidding. They are fair better than the other two courses that you followed.

There are exceptions to where you would not use auctions, -- public safety, public telecommunications -- and I agree with what Gail said, the nonexclusive licensing can be very much in the public interest and should be accommodated. The only other thing is that in the area of the broadcast, you had a question, how is the public interest to be determined; and I think there you have a very severe problem.

MR. GATTUSO: I'm James Gattuso. I am vice president at Citizens for a Sound Economy. I just want to say that I believe the Commission's auction program has been a success, but perhaps not for the reasons many people say. It's not a success because of the money that it has raised; it's been a success because it has been able to put spectrum into the hands of those who value it as quickly as possible.

In practical consumer terms, that means that consumers were able to buy PCS phones last year instead of having to wait until the turn of the next millennium.

I believe that auctions -- I agree with Henry that auctions should be used in most every case where mutually exclusive applications exist; not every case, but it should be a general rule, and there should be a very high burden or proof to show when auctions are not to be used.

Further, I think that auctions themselves are only a small first step towards getting done what needs to be done in spectrum management. We need to assign spectrum more exhaustively so that every bit of spectrum that is available is assigned to someone and in a way that it can be used for innovative purposes. And, also, as was discussed at the last panel, I believe it should be assigned flexibly so that those uses are allowed under Commission rules.

MR. PERRY: I'm Wayne Perry, AT&T Wireless Services, and I am the person who is responsible for AT&T's bids in the narrowband and broadband PCS, which resulted in us sending you a check for $2 billion. I assume it cashed, cleared or we would have heard from you.

MS. CHONG: You bet.

MR. PERRY: So I guess for that purposes we are part of the end of the process, and I'll tell you it's

worked, it's worked darn well, and we are now on to, I think, working together as an industry and implementation with cellular flexibility and interconnection and cell citing, and all of the issues that are necessary to bring about the promise that auction started.

CHAIRMAN HUNDT: I believe the way we were going to do this is I'm going to ask a few questions in a "Q-and-A" style, and who is next? Andy --

MS. CHONG: Andy and Susan.

CHAIRMAN HUNDT: -- and Susan. Okay. Thanks. Wayne, you have said in your written statement, auctions are always appropriate. Does that apply to digital television licenses, in your view?

MR. PERRY: Well, I tell you, I think you ought to come at every single gran of a spectrum with a predisposition towards auctions being the most efficient, fair method of doing it and make somebody come up with a reason why it is not appropriate.

CHAIRMAN HUNDT: Do you know any reasons why we should not auction, as a country, why we should not auction digital television licenses?

MR. PERRY: Nope.

CHAIRMAN HUNDT: Jim, could you -- we are moving from right to left -- Jim, do you have any opinion on this

subject?

MR. GATTUSO: I think we are already auctioning broadcast spectrum. The only question is whether the auction occurs at the initial assignment or whether it occurs in the aftermarket, and I think the same thing will be true with digital licenses. So I do support auctioning of the new digital licenses.

CHAIRMAN HUNDT: Okay. Everyone understands that this is a question for Congress and not for the Commission, but it does inform the whole topic here today. Henry, what are your views on this topic?

MR. GELLER: I wouldn't be against auctioning digital ones, but it seems to me that there is a consensus to allow the broadcaster to enter the digital era. If you are going to do that, then you have to manage the transition. And so what I've said is either auctions, digital or do the seven-year auction with their getting of in three years. But if you want to allow the broadcaster to enter that digital one and you believe, as Congress seems to believe, that it's important to do so, -- and it is the decision for Congress -- then I suppose we will proceed with it. I think we have to determine what's the public interest standard to govern in those circumstances. Should there be a public-trustee concept, and how do we get back that --

ensure that we get back the other six analog megahertz rapidly?

CHAIRMAN HUNDT: Dale?

MR. HATFIELD: I think, first of all, of course, I'm in favor of auctions in principal, and I think I'm very close to what Henry is saying here is that we -- and something I expressed in my written statement, is that you could be fragmenting something here that's a very large block of spectrum. It could be fragmented in ways that would be difficult to maybe back away from. So stopping and thinking about what we want in terms of over-the-air broadcasting in this digital world is probably appropriate.

So, in principal, yes, but I think this is a unique situation we need to think about.

CHAIRMAN HUNDT: As far as I can tell, there is only the following options for Congress. It can auction the digital licenses, and it can award them instead to someone. It could award them to the telephone company or to you gentlemen here or to the incumbent broadcasters. Wayne would like it. But if it awards them to the incumbent broadcasters, presumably it can require, then, that the analog spectrum be returned.

As far as I can tell, the options are return it in seven years, which is faster than broadcasters want, or

return it somewhere in the 15- to 20-year region. Which of those options, unless you have another one, Mateo, would you support?

MR. CAMARILLO: [Too close to microphone.] I have participated in comparative hearings in lotteries and now currently the "C" block auction. I think auctions can work. They haven't worked from my perspective in reference to public interest issues, such as the inclusion of a diverse America. I don't think that minorities and women have had a fair chance. I think the fifth report had the potential of working with a little tweak on some of those rules. Once you introduced some other aspects, some affiliate kinds of loopholes, you see what's happening now under CITA-ALEGA.

CHAIRMAN HUNDT: Auction the digital licenses or assign them to the broadcasters?

MR. CROSBY: I would hope there would be -- I would recommend assigning them to the broadcasters, and, hopefully, there would be -- because, obviously, I'm interested in seeing if there is some other alternative other than auctions to provide compensation for the use of that spectrum; so I'd like to see a debate to see what might be another method other than auctions.

CHAIRMAN HUNDT: John, feel free to add to the option list if you feel that I've overly confined it.

MR. BLAKE: Well, I think that the give-back ought to occur when there are no longer a substantial number of the public who are relying on the old NTSC technology. It seems to me that if the decision has been made that broadcasting should transition to digital, which I think there is sort of a consensus that that's the case, broadcasters are really not all that much different from those microwave users who had to get out of the two gigahertz band and transition to another spectrum band.

And nobody said that when they moved to six gigahertz that that was going to go up for auction or that they would no longer have the ability to transition. When power has to move up to six gigahertz, there is no notion that that will be auctioned.

The difference is that here broadcasters have said we want to transition to the new world, this is the way to do it, and it has worked with the government over many years, and I think that plan ought to go forward. I think it's a very well-designed plan.

CHAIRMAN HUNDT: And Shelly?

MS. SPENCER: I would echo Mateo's concerns. I think with broadcast, it's the area most in doubt with the public interest because we are not only carrying bits, we're carrying content, and that's very important that we have

diversity not only in front of the camera, but behind the camera in an ownership. And I'm not sure how you reconcile those concerns when everything is then auctioned, including digital broadcast.

CHAIRMAN HUNDT: John, you said, I think, in your opening 60 seconds that the reason that we have 98 percent penetration for broadcast television is because it's free. Is that a fair statement?

MR. BLAKE: Yes.

CHAIRMAN HUNDT: Excuse me, but why do we have 95 percent penetration for telephone subscriptions?

MR. BLAKE: Well, because I guess it's an essential service.

CHAIRMAN HUNDT: But people are paying for it.

MR. BLAKE: That's right.

CHAIRMAN HUNDT: So is it actually the case that merely the fact that the product is free accounts for the penetration, or isn't there a relationship between the fact that you don't have to pay plus there is something that is desired by the public which causes them to want to invest in a television?

MR. BLAKE: I'm sure it's both.

CHAIRMAN HUNDT: And how many people, in fact, are not receiving free, over-the-air television either over the

air or free? In other words, for how many Americas is free, over-the-air television not something that they consume?

MR. BLAKE: Oh, I think it's 98 percent. It may be that they are consuming it through their cable system, but they are still consuming the product of that system. Sixty-five percent of viewing on cable, somewhere in that nature, is of free, over-the-air television signals.

CHAIRMAN HUNDT: So if we gave today's broadcasters must-carry rights on all available transmission media and they were therefore able to reach 100 percent of the country, could we take the spectrum back and give it to Wayne or auction it?

MR. BLAKE: I don't understand that if you added up all of the nonbroadcast video delivery systems, you'd have 98 percent.

CHAIRMAN HUNDT: I said it would be available.

MR. BLAKE: Well, cable, I don't think, passes 100 percent of the homes.

CHAIRMAN HUNDT: Ninety-five percent, and the satellite is 100 percent. So what's wrong with the concept -- I think there is an answer to this, but what's wrong with the concept that you give today's broadcasters must-carry on all available transmission media and if you want to regulate the price of basic cable, if Congress wanted to continue to

regulate that, we could regulate that real low and extend that all across the country like telephone service, and therefore we would give broadcasters not only digital television, but everything else -- wireless, cable television, satellite television, LMDS television, video-dial-tone television. What would be wrong with that as a concept?

MR. BLAKE: Well, it doesn't seem to me it takes into account the availability for free of over-the-air television.

CHAIRMAN HUNDT: Well, two-thirds are already paying for this product, so aren't we prejudicing the issue a little by calling it "free"?

MR. BLAKE: They are the ones who have chosen to do it through another mechanism. That doesn't account for the 35 percent who either can't or won't or don't have access.

CHAIRMAN HUNDT: Well, they all have access.

MR. BLAKE: Right.

CHAIRMAN HUNDT: Television reaches 98 percent of the country. Cable TV passes 95 percent. The satellite passes 100 percent. It's a question of whether we want anyone to be required to pay anything.

MR. BLAKE: To subscribe. Right.

CHAIRMAN HUNDT: Right. And we do require -- to pay for the telephone system or the cellular service and -- in the communications medium, so I'm asking what is the distinction? I think there's answers, but I'm asking what is the distinction.

MR. BLAKE: Well, I think the distinction is that you have a service that has rendered all of these benefits, and it would reduce the public benefit to all of a sudden put a price tag on this and withdraw it from people who cannot afford it or have some other obstacle to receiving it.

CHAIRMAN HUNDT: Wayne, any comments?

MR. PERRY: Well, if the issue is free public broadcast television, why not put a restriction on the spectrum that says it's got to be used for free public broadcast sector and auction that?

CHAIRMAN HUNDT: Jonathan?

MR. BLAKE: That's acceptable.

CHAIRMAN HUNDT: That would be acceptable? So we could auction digital television licenses as long as they are --

MR. BLAKE: You could put a restriction on that would require -- in fact, our organization has said that the digital channels ought to be made available for

broadcasting.

CHAIRMAN HUNDT: I think Wayne was suggesting that we would then auction these licenses that were so conditioned.

MR. BLAKE: Well, okay. Let me address that. If you have -- if you auction the channels as they are proposed in the allotment assignment plan that the Commission and the industry have been discussing, they would have to be used under power/height/location restrictions, because that's the way to maximize service to the public to avoid interference and dislocation and disenfranchisement of viewing.

If you did that, the new bidders would be bidding into a market where there are no sets, and presumably the broadcasters would be the ones most likely to win the auction. But there would still be uncertainty, there might be speculation, there would be transaction costs that would be involved, and the amount of money that we raised under those circumstances would be so small that it would not be worth jeopardizing the fragile transition to digital television.

CHAIRMAN HUNDT: How would the transition under this scenario be jeopardized? Wouldn't those licenses go to the -- than the most, whatever the price is?

MR. BLAKE: Well, if, for example, in Washington,

D.C., the way to maximize service to the public is to require that Channel 24 be paired with Channel 4 in Washington. If you don't do that, you have destructive interference; a lot of people lose their service in the transition.

The great likelihood is that, therefore, Channel 4 in Washington will bid the most, but there maybe speculators and there may be speculators in the auctions that you are conducting now, and if they should happen to win or drive up the price, you have an industry that's facing $16 billion in the cost to transition to digital television, you would add those costs and uncertainties, it seems to me like it's a risk that's not worth a very small amount of money in terms of auction revenues.

CHAIRMAN HUNDT: Approximately how small?

MR. BLAKE: My guess is it would be in the neighborhood of a billion dollars.

CHAIRMAN HUNDT: Just a billion dollars?

MR. BLAKE: Yeah.

CHAIRMAN HUNDT: Wayne?

MR. PERRY: Well, six megahertz of spectrum, clean spectrum going across this country seems to be going for a lot more than a billion dollars.

MR. BLAKE: You are talking about for

broadcasting, Channel 4 at a certain power and height and location. If you want to do it sort of open sesame, if you have an open auction, then you do have a different answer. If you have an open auction, you can use it for cellular, then I think you're talking big bucks, and I also think you're talking about the death not only of the opportunity for the public television service to transition to digital; I think you're talking about the death of public television service anyway, because then it would be left in digital -- left in analog and would wither away.

CHAIRMAN HUNDT: Analog TV is going to wither away?

MR. BLAKE: If it can't go to digital with everybody else going to digital, it doesn't seem to me that it can survive.

CHAIRMAN HUNDT: How soon is analog TV going to wither away, assuming the broadcasters have digital licenses where they can broadcast anything they want? How soon will the analog service wither away?

MR. BLAKE: Well, if -- is this assuming that the ATV channels are assigned to broadcasters?

CHAIRMAN HUNDT: Just the way you want it. How soon will the analog service then wither away?

MR. BLAKE: Well, I would think that in terms of

broadcasting, it would be broadcast by most stations right up to the point where the NTSC channels had to be turned back in, but not all.

CHAIRMAN HUNDT: But how long? How soon will it wither away -- they be able to return the channels because there is not an audience that is sufficient to make it worthwhile to run the business?

MR. BLAKE: Well, if I had to guess, I would say it would be in the neighborhood of 12 years.

CHAIRMAN HUNDT: Twelve years? And that's based on what projections?

MR. BLAKE: That's my guess.

CHAIRMAN HUNDT: Okay. Is that based on some notion of how fast the digital television audience grows?

MR. BLAKE: Yes.

CHAIRMAN HUNDT: Can you give me your -- of that scenario? year one? year two? year three? Is a straight-line curve, a couple of million households a year? Is it an accelerating curve? How does it go?

MR. BLAKE: Well, actually, the curve that I've seen that I was most impressed by was one developed by OPP. And my sense was that it was not a straight-line curve; t took a slow take-off and then accelerated sort of in the sixth or seventh year, and then sort of tailed off at the

very end.

CHAIRMAN HUNDT: So, in six or seven years, how many people would have digital television receivers under your scenario?

MR. BLAKE: It might be 40 percent.

CHAIRMAN HUNDT: Forty percent of the country?

MR. BLAKE: It might be.

CHAIRMAN HUNDT: You say in your statement, subscription-based services can pass on the cost of auctions to consumers, unlike nonsubscription services.

MR. BLAKE: Yes.

CHAIRMAN HUNDT: Can't nonsubscription services, for example, broadcast TV, pass on the cost of acquisition to advertisers?

MR. BLAKE: They are -- broadcasters are in competition with other advertising media, and they can't turn around to the viewer in a particular home and say, because we've had to invest $10 million in new plant, therefore, you've got to pay more money; or because we've had to pay "X" million dollars for an ATV channel, we have to recover it from you.

In a subscription service there is a direct relationship -- it's the point you made earlier, that the base for over-the-air television is advertising dollars,

whereas it's the viewers who are getting benefits from it, and that indirect relationship was the point that I was trying to make.

CHAIRMAN HUNDT: And you make some very good point about the difference between closed systems and -- I think that's your phrase, isn't it? --

MR. BLAKE: Yes.

CHAIRMAN HUNDT: -- closed systems and open systems. But isn't it the case that Westinghouse plans to -- the cost of acquisition of CBS stations to someone, specifically they want to recoup it from advertisers and a variety of other markets. Isn't that right? In other words, you can pay for a TV license and still try to find a way to get your money back.

MR. BLAKE: Yes, but that's not the same thing as in subscription where you deal with your direct customers in terms of the charges.

CHAIRMAN HUNDT: Yes. It isn't the same thing, but they pass on the costs to someone, and they seek to pass it on to advertisers. Isn't that right?

MR. BLAKE: Well, they may or may not be able to pass it off.

CHAIRMAN HUNDT: Well, I agree that Westinghouse doesn't know for sure, but it certainly -- to pass on the

cost to someone. We agree about that, don't we?

MR. BLAKE: Yes.

CHAIRMAN HUNDT: And we agree that -- almost $20 billion for ABC, which is to pass the cost on to someone.

MR. BLAKE: Well, it may be that they wish to pass on the cost; it may be that they think they are going to be able to make a profit out of the service they are rendering.

CHAIRMAN HUNDT: So -- in that particular issue, I think we can assume that people who purchase digital television licenses or who acquire them, whether they are by assignment or by auction, they will try to make money from them.

MR. BLAKE: Of course.

CHAIRMAN HUNDT: They will try to charge advertisers for the time or subscribers.

MR. BLAKE: Yes.

CHAIRMAN HUNDT: Doesn't that make things for us, if we care about preserving some element of free, over-the-air digital broadcast to allow some subscriptions as well, some subscription digital TV as well?

MR. BLAKE: I think precisely -- agree with that statement.

CHAIRMAN HUNDT: Maybe you'd better say it in your own words, then.

MR. BLAKE: Well, if there is a requirement that some of the capacity continue to be used for broadcasting, that is free broadcasting available to all, what is done with the additional capacity I think could be preserved for subscription.

CHAIRMAN HUNDT: My time is up. Thank you very much. Commissioner Chong, do you want to go next?

MS. CHONG: It's Commissioner Ness' turn.

CHAIRMAN HUNDT: Commissioner Ness.

COMMISSIONER NESS: Okay. Thank you. I don't want to belabor this because we have already had a discussion on advanced television at our en banc a couple of months ago. But just to follow up on one fragment of this discussion, does anyone have a sense of whether it would be more valuable to auction contiguous spectrum or small, six-megahertz pieces of spectrum that are interlaced or interstitial with analog television as it exists today, where there is no contiguous spectrum and it is in different locations in each geographic area?

Anyone want to take a stab on that? Is the value the same? Wayne, is a megahertz the same in one instance as a megahertz in the other?

MR. PERRY: It's always spectrally more efficient to have contiguousness because your masking goes at the

edges and therefore you've got more usable spectrum. So it's kind of like a setback on real estate. You have ten feet on each side you can't use, but you use the middle, and since your lot is bigger, you have the same setback. So it's more efficient.

COMMISSIONER NESS: So if given an option, for example, to purchase at auction the interstitial pieces that would be available but have to work around the analog television because there wouldn't be a transition to digital for broadcasters, if you were given a choice between buying that at auction and buying the return analog spectrum after repacking of the digital where there might be larger chunks and these would be available on a national basis, which might be more attractive from an auction standpoint from your perspective?

MR. PERRY: Well, I'm not going to worry about the analog spectrum being returned, because that's not going to happen at auction in my lifetime, so I'm not going to worry about that.

COMMISSIONER NESS: Okay. Assuming that there were a way of making that happen, which would be a better bargain or a better purchase from an auction standpoint?

MR. PERRY: I think sometimes auction dynamics, the most efficient spectrum thing is not nearly as important

as maybe some of the other dynamics of the auction, that allows enough participants. Spectrum is just one element to making a successful auction.

COMMISSIONER NESS: John, I hate to keep bothering you, but why don't you answer the question as well?

MR. BLAKE: There is an experience that the Commission has had in the past that might illuminate this question. In the -- oh, maybe 15 years ago the Commission did two things with respect to broadcast spectrum. One, it had sharing in Channels 14 through -- in the top 15 markets or so. That was interstitial spectrum -- analog -- the parameters are a little different today, obviously. And then there was the setting aside Channels 70 through 83 for land-mobile, which was a solid, cleared block, and the latter was of far greater utility, I believe, to those people who wanted to use it.

MR. CROSBY: We enjoyed it. You will also have, just as a comment, you have on the immediate horizon, to help you perhaps answer that, auctions are going to be conducted at 800, and one of the benefits to help deploy some of the advanced digital technologies, it was the manufacturers and the incumbents, I believe, were those prospective bidders. Contiguous spectrum is very critical. When you migrate down and try to or attempt to auction at

800, you have some interstitial type of problems there, so you might have in the very immediate future some experience that might help you answer that question.

COMMISSIONER NESS: Okay. Thank you. Moving on to a little bit different topic, Dale, do you agree or disagree that auctions are always appropriate; and if they aren't appropriate at all times, what factors should we take into account in determining that spectrum for a specific use should or should not be auctioned?

MR. HATFIELD: Yes. To keep my answer short, generally I think the presumption should be in favor of auctions. There are -- in shorthand, the two times that it would apply is when there is exclusive rights for the exclusive use, which we've already talked about, it should apply there; and, secondly, if there is no overriding social issues or, in particular, there is no marketplace failure.

And the example that I would give of that if one group we have not heard here is amateur radio operators, for example, and it seems to me -- and I'm a ham, I confess -- and it would seem to be very hard to aggregate funds from enough hams to be able to buy spectrum, and yet I would argue that there is a large social benefit from having kids being able to experiment with radio as I did when I was 13 or 14 years old.

COMMISSIONER NESS: So you would not auction the ham spectrum.

MR. HATFIELD: Exactly, exactly, exactly, exactly.

COMMISSIONER NESS: I'd have a hard time with Dave Sidell on my staff, who is also a ham radio --

MR. HATFIELD: Yeah. Right, right. No, I didn't talk with him advance. But that's sort of an extreme example, but that's very clearly where there is a marketplace failure. You wouldn't capture, because of the transaction costs, you wouldn't be able to capture the full value to society of that spectrum.

COMMISSIONER NESS: Wayne, would you agree that we ought not to auction the ham radio spectrum? You were smiling at that point.

MR. PERRY: Yeah. There are things that obviously -- you have a public policy obligation, and you need to set the parameters of what these services are going to be used for, and then I think the auctions are the most efficient way of providing the service.

COMMISSIONER NESS: Okay. So, in other words, we ought to do an allocation, --

MR. PERRY: Yes.

COMMISSIONER NESS: -- and the allocation ought to be based on more than just simply a marketplace

determination based on auction.

MR. PERRY: I believe that's the appropriate.

COMMISSIONER NESS: Does anybody disagree with that? Okay. Should spectrum for private radio services be auctioned, Mr. Crosby?

MR. CROSBY: No.

COMMISSIONER NESS: And, if not, how should we select from among mutually exclusive applicants?

MR. CROSBY: Let me explain the "no." In very, very, very rare circumstances are there mutually exclusive situations. The critical industries and the public service and obviously the public safety entities, we share spectrum. We've been sharing spectrum for 40 or 50 years. We don't design our systems for marketplace.

We don't need to define a piece of real estate; we sort of -- we do it ourselves. But we do agree that there should be -- the majority that, you know, the days of free spectrum are over, and there is an obligation to render a fair reimbursement to the federal government to use the spectrum. We like spectrum lease fees, and I think they can be crafted -- they need to be carefully crafted because if they are set too high, you limit the use of the spectrum; if they are set too low, you don't accomplish what you're trying to accomplish.

COMMISSIONER NESS: Would that contribute to spectrum efficiency?

MR. CROSBY: Oh, absolutely, absolutely. As a certified spectrum manager, spectrum lease fees would be wonderful. You would have people defining and designing systems based on their requirements only, and it would be incredibly spectrum efficient.

COMMISSIONER NESS: Does anybody have a differing viewpoint for spectrum lease fees in the areas where we don't auction or a better mechanism for getting back the value to the American public?

MR. GATTUSO: Well, I think we get back to flexibility again with that question.

COMMISSIONER NESS: Okay.

MR. GATTUSO: I think if you're trying to set up any sort of fee system, the odds are that you're going to get the fee wrong. The best way to get that costs measured correctly is to provide the user an alternative use, the flexibility to use that spectrum for something else, and that creates an automatic opportunity cost that they are going to be watching very closely to make sure that their current use is at least or more valuable than that opportunity cost. If they aren't, then they will switch to something else.

Now, this involves setting up the interference criteria in a clear way so that you can exercise those choices, but I think that is a better way to go than fees.

MR. CROSBY: Well, I think -- if I may.

COMMISSIONER NESS: Please.

MR. CROSBY: In the private industry standpoint, James, you know, we use it -- our constituents and members in industries use it to increase their productivity, enhance their welfare so they can compete, the public safety, obviously. You know, they use it for internal business purposes on a noncommercial basis. They are willing to pay a reasonable spectrum lease fee to do that. When you get into flexibility, they are not in the business of paging or broadcast or PCS or cellular; they use it for their internal purposes.

So that's not their business; they are in the business of, you know, road construction and agribusiness or manufacturing. They don't want to be into paging and other kinds of things, so I don't know if flexible allocations necessarily, if that's what you are referring to, are applicable for private industrial.

MR. GATTUSO: Well, if they are using it for internal purposes and that's the best use for that, then there is no problem. Then you get the flexibility and there

is no change with the current system; there is no disruption. I would go back again to the land analogy. I'm sure you remember also in land whether to put factories on or headquarters or whatever, and there is always an alternative use for the land, and there is someone in the company who is always looking to say, "Well, do we need that extra building over there? Do we need that annex? We could sell it to someone on the open market if we are not getting enough value for it."

And that's not disruptive, but that doesn't involve an administrative agency setting a fee for that land, but you're constantly evaluating whether it's being put to the best use.

MR. CROSBY: But I think that land would be zoned for certain purposes, so, I mean, there already been perhaps a public-interest determination.

MR. GATTUSO: I don't know if land is known for -- mobile; it's a question of how specific you're making it.

COMMISSIONER NESS: Mr. Geller, do you agree or disagree that private radio services should be auctioned?

MR. GELLER: Yes. The public safety, I would not auction. Chuck Jackson's paper pointed out that even if you get over the fact that it so much in the public interest -- economic matter, it's very difficult to aggregate them.

There's only a few channels in various places, and, in any event, I think that if you tried to do it, the howl would be so great that you would be lynched at sunrise. And so you are better off in the highest -- I think it's a policy decision in the highest sense of that abused term. I would not try to auction public safety. When you get --

COMMISSIONER NESS: But other private uses?

MR. GELLER: But in the other areas, the private, the answer is -- I'm in agreement with what I said earlier, that it seems to me that if it is an exclusive allocation, then it ought to be auctioned with great flexibility and, obviously, with interference rules of the road and so on for out-of-band interference.

COMMISSIONER NESS: Dale, any thoughts to contribute on that?

MR. HATFIELD: No. I think I agree.

COMMISSIONER NESS: Okay. Commissioner Chong?

MS. CHONG: Thank you. Mr. Camarillo, you've argued that auctions are harmful for minorities because of the lack of access they have to capital, and, Ms. Spencer, you've made a similar argument as to women. And you've been arguing about diversity in licensing, and I'm not just talking about broadcast; I think you're talking in a broader sense that broadcast.

I note that recently the courts have struck down racial preferences as to some of our services, and I wanted to just throw out that if the Commission were to decide that diversity of ownership in communications is important, how should we structure our licensing procedures in way that will promote diversity and yet survive legal scrutiny?

MS. SPENCER: I'll go first on that. I think what's important -- and one of the things that AWRT has asked the Commission to do since 1991 -- is to really to a study to provide you with the evidentiary foundation to support policies that promote ownership by women and minorities. I think with that study and with that data, you can pass the legal standards.

We need to be very careful, I think, not to overreact to some of the recent decisions, like Adarand. I don't think you were referring to that one in particular, but it discuss Metro, although it did not overrule Metro; it just said there is a new standard which we will apply to racially based policies. And I would note that's different than the one that will apply to gender-based policies, which is still intermediate scrutiny.

But I think we need to be very careful right now and to look at where women are in the industry, where minorities are, and to assess in the current licensing

scheme, be it auctions, which we had gender- and race-based rules up until the broadband PCS auction, and they were changed for the "C" block, and we can look at how did women fare in the "C" block without gender-based rules? They were eight percent of the 255 applicants, small women-owned businesses. We can compare that to the auction that Wayne competed in for the narrowband PCS, where women won 16 percent of the licenses, and we can see some differences there.

When you look at the differences that, with appropriately tailored policies meant to address the barriers that women really do face in accessing capital that's shared by minorities, looking at a capital- intensive business, I truly believe you can foster and adopt not goals, not mandates, not requirements, but incentive-based policies that will let women and minorities really be part of this dynamic industry that we are all lucky to be involved with.

COMMISSIONER CHONG: What do you mean by an "incentive-based policy"?

MS. SPENCER: There are a number of policies that AWRT has supported in the past, one of those being obviously having an additional credit in an auction where women and minorities had originally in the PCS auction would have

gotten a 25 percent bidding discount different from a small business. That was something that was looked at again, although no conclusion was reached after Adarand. I think we can look at those kinds of things.

Also, we have proposed looking at things like an incubator policy for broadcast stations. Maybe this is something in connection with looking what happens with digital broadcasts. Do they get some additional spectrum, or do they get some additional value if they incubate a woman-owned station or if they have women who are their network-affiliated stations, do we give them some credits?

There are things like that that I think we can all be very creative with and stay within the letter and the spirit of the law and adequately address discrimination that still does exist today.

COMMISSIONER CHONG: And the other thing I think you forgot was installment plans.

MS. SPENCER: Yeah. That was the other thing.

COMMISSIONER CHONG: The key problem is access to capital, according to your filings.

MS. SPENCER: Yeah. Absolutely. We did have with PCS -- that was another difference. There was installment-based plans for women for the first six years and minorities that were also small, and that was different from the small

businesses. It's interesting. In the Wall Street Journal yesterday, there was an article on the "C" block auction, and two of AWRT's members were quoted, one who was trying to go to the auction and the rules changed midstream, and she said, Before, I was a hot commodity; then I was a plague after the change in the rules. The other woman actually went to the auction and has since dropped out because of the prices.

So women are ready to participate, but we need to look at do market-based systems account for the discrimination exists. And I would term that as a market failure that needs to be addressed by government policy.

CHAIRMAN HUNDT: Mr. Camarillo?

MR. CAMARILLO: [Too close to microphone.] Picking up on -- and I support the comments that Shelly has made, and I would add -- I suggested this before, that I believe it is important that the FCC immediately begin a closer study to ensure that the FCC meets the strict-scrutiny standard. However, -- I do believe that there can be some successful race mutual policies administered by the FCC. For example, size standards. I believe if we had some size standards comparable to what the Small Business Administration has had in place for many years in telecommunications, the "C" block, you would see it a little

more viable and more diverse in reference to participation.

Right now, you can see that five of the auction participants control 80 percent of the --, and even though you have a limit of 10 licenses, you can have 10 licenses and have a significant footprint in this country. I do think that there ought to be -- to do that. I think you are moving in the right direction with setting up a trust fund. Hopefully -- of that trust fund, the people on it will have some understanding of the needs of the small business person, with the accent on the "small."

I do -- SBA the standard -- they have two standards in telecommunications that are applied to what we are talking about. The broadcasting standard is five million. For categories not listed -- specifically, for example, PCS is not listed -- that standard is 4899 SIT code. That standard size is 11 million for small.

I feel that if you had those kinds of comparable standards as to eligibility for the "F" block, you're going to see a whole different -- those are the kinds of -- that you ought to take.

[Inaudible; too close to mike] -- at Adarand, but I think I would be lynched with the other fellows that are going to be lynched by sundown, so -- we could wait a little while for an appropriate Adarand study.

COMMISSIONER CHONG: Do either of you think that the new telecom development fund that will be set up under the 1996 Telecommunications Act will assist minorities and women in competing for licenses?

MS. SPENCER: Well, as I recall that act, there is a provision in that section that prohibits them from taking into account gender and race in doing things, including the allocation of money; so I would see that fund as having its hands tied in terms of being able to target women and minorities as applicants that they would want to fund.

COMMISSIONER CHONG: On the other hand, if you use a size standard, as Mr. Camarillo suggests, isn't it true that a great bulk of the women and minority applicants fall under the levels for what is considered small by SBA and others?

MS. SPENCER: I believe that's true, but I'm cautious about it because of the PCS experience. If only eight percent of the applicants were small, women-owned businesses in the "C" block and a lot of them would still have qualified as small, why didn't we see greater numbers? I'm concerned about that, and not having analyzed those auction results yet, I will continue to be concerned about that until we can pinpoint whether really going race and gender neutral solves things. I'm not sure that we can say

that will solve things yet. Hopefully, some day, but not yet.

MR. CAMARILLO: [Too close to mike.] Commissioner Chong, -- a little brief -- and I'm optimistic in reference to the trust fund, because, by statute, you cannot make loans in excess to entities over 50 million, so -- and, hopefully, they will be on the opposite end there will be some kinds of incentives for prioritizing based on need, financial need, so that the little guy will have some consideration and, hopefully, the people on that board will take and give the due consideration for those factors.

COMMISSIONER CHONG: Mr. Perry, you've said that auctions are always appropriate. What do you do about people represented by Ms. Spencer and Mr. Camarillo? Do you think it's appropriate to have some preferences as to diversity issues or not?

MR. PERRY: I think that's the determination of the Commission. As a businessperson, we just need certainty. I mean, I think what happened in the "C" block was there was such uncertainty because of Adarand that there wasn't the full participation. It was difficult to get participation of everyone. It was kind of a stilted process because of that. When it turned and Adarand came down, I think the Commission did the only thing it could do, which

is get the service to the public by opening up to small businesses.

We're not participating in the "C" block, -- we are ineligible for the "C" block -- and yet it seems to be amongst those people who you found the best people to be participating at auction. An auction is the best among those, so maybe a situation where you pick the participants, if it's a broad enough group, but then let an auction occur.

COMMISSIONER CHONG: Mr. Geller, in your opening statement, you made an interesting statement at the end, something about there is a severe problem with the public interest, and then as we breathlessly awaited the rest of your sentence, you stopped. So I'm wondering if you could elucidate for me what it was you were referring to and why it is a severe problem.

MR. GELLER: Let me just, in this issue around, that you can see in the '96 Act that Congress did not want to go near the minority and gender issue in the telecommunication development fund; they made it neutral and small business. The one thing I would be afraid is that they didn't put enough money in it, just by using the interest in the escrow. And I urge in my statement that you might look at that and see whether some funds from the auction itself might be allocated to that, because it does

avoid the appeals that seem to flow from the strict scrutiny of Adarand with minorities and even the intermediate standard on women.

And what I raised was, in the questions that were distributed, you said how was the public interest determination to be made. In a lot of fields you don't have to worry; you have allocated for public safety, and when it's used for that, that's fine. In most of them you simply get it to its highest valued use in PCS, and the flexibility works for you and you don't have to worry again about the public interest; the market is working for you.

When you get to broadcast, the allocation has been made on a free basis because the broadcaster is to serve as a public trustee for his community. And that gets you into very difficult problems. It gets you into behavioral regulation, as you found out in children's television implementation about what's the standard, how you define it, whether a particular program comes within it.

And all I was raising -- and I know this is a question for Congress, not for you, but you have been asked to and you can recommend -- that it seems to me that a section of the '96 Act that says "broadcast reform" isn't reform at all. All it does is keep the public trustee notion, and that was evolved 60 years ago. You now are in

an era where you have cable television, DBS, telco is coming, LMDS -- all these ones coming -- a multichannel one. You are entering the digital era, as we all talked about, and yet this one area of broadcasting is regulated still under content, public trustee regulation with all its First Amendment strains.

I'd go on to say, as you know, that I don't think it's been very effective either, but even beyond that, the recent Turner case pointed out that when the Justice argued to extend redline and public trustee regulation to cable, the court refused. It said that all the new electronic media will come under traditional First Amendment jurisprudence. If it's content, strict scrutiny; if it's content neutral, O'Brien, the intermediate; and yet this one area uniquely is still left out there hanging.

You have asymmetric regulation of cable and broadcast. People click on the set, don't pay any attention to what they are looking at. One of them is not regulated as to content, cable. It pays a five percent franchise fee. It has a long-term franchise.

Why shouldn't broadcast, as you go into the next century, also avoid these First Amendment problems? Why shouldn't it pay two to three percent of a spectrum fee to be used for public telecommunication because there is public

service to be rendered, and then you would get rid of the First Amendment strains and really prepare broadcasting for the next century. We are not doing that now; we're just kidding ourselves, I think.

COMMISSIONER CHONG: My time is up. Commissioner Barrett?

COMMISSIONER BARRETT: What I want to do is, Henry -- it's always a pleasure to see Henry. If Henry wanted to further continue elaborating on that, I'd like to hear that, and then we can open it up, if you don't mind. Were you finished, Henry?

MR. GELLER: Well, I'll finish rather rapidly just to say that I'm not saying that there is not public service, that there aren't market deficiencies. There are. In children's television, you heard very eloquently from Henry Cauthen in the last panel that they are our future and you want to ensure that the parent does have high-quality children's television, for example. You particularly want it for the school-age child, six to nine.

I think it's the wrong way to proceed to try to get it out of the commercial broadcaster. I'm not faulting him, but he is not going to do "Sesame Street," he is not going to do "1-2-3 Contact." He is going to try to put as much entertainment as he can because he needs the eyeballs.

And, therefore, it seems to me that as we go into the next century, we should have a structure that works for the accomplishment of the governmental goals here, that relieves the broadcaster of First Amendment strain, says you are like cable, you have a long-term franchise, 15 years, you don't have the content regulation, you don't have to show on renewal that you served as a public trustee, but, on the other hand, you do have to give up a certain percentage of your revenues.

I would take the two to three percent. If you did that even for six years, you would have the $4 billion trust fund you need for public telecommunications, and you could cut it loose. The government would no longer be involved in it. The money then could either go to the treasury for deficit reduction, for R&D, or for the telecommunications development fund, so that small business, including minorities and women, might get more.

It would be a congressional judgment as to what to do, but what I am saying is that Title II did reform telecom in the '96 Act; it's been reformed. Cable has been reformed, but when you get to broadcast, there is no reform; it's the same old story: public trustee renewal and First Amendment strains.

COMMISSIONER BARRETT: Have you got a followup

question?

MR. BLAKE: I just want to present a different viewpoint with respect to Henry's statement that it hasn't worked very well. The public consistently ranks over-the-air free television as its most reliable source of news and information. It is watched seven hours, household, per day. It has rendered a great deal of public service, and I suspect one of the reasons why Congress didn't change it was the recognition by its constituency that, in fact, broadcasting is working well.

There are obviously respects in which there has been intervention by the government with respect to political broadcasting and other issues, but in terms of the model having worked, it seems to me that the voters, i.e., the viewers, have expressed their views.

MR. GELLER: I don't disagree that broadcasting serves a great public interest in its entertainment formats and its news and others. What I am saying is that the regulatory scheme is not working. They send a postcard in at renewal in broadcasts in radio, and the Commission simply renews. It has not idea what the public service is, and you really ought to let go of it.

In television, you send a postcard in. You don't know what the community issue-oriented programming is. The

news is going on not because of Commission dictate, but because it's very sensible for the broadcaster to lead into the evening with news. I commend them for that, but the only time that you have real regulation is the Children's Television Act, and that is a mess.

There, for the first time, Congress said, There is a programming requirement, you must meet it, educational, informational, including core programming designed to do so. And I don't have to tell this Commission that you are all wrapped up into how you do that, and until the broadcast, until this Commission ratcheted that issue up with a notice, the broadcasts were doing a half hour of core programming.

And if you look at it, the lawyers had sent out notices saying you have to have at least a half hour of this core programming. That's what they were doing. Now, the issue is how much do you have to do, and you have to look at the whole -- and I agree with this. Under the Act, you have to look at everything, not just the core programming, but adult programming that's served, short-segment programming. It's necessary to do that, and when you look at all that, you have a very difficult task at renewal.

And you have to also quantify and judge whether the programming comes within whatever definition you decide on. Is it 6 a.m? 7 a.m.? How do you define it? And this

act, as somebody once said long ago, works as long as you don't try to implement it. If you try to implement it, you are in deep trouble, First Amendment and others, and I'm just saying that we're now going to the next century. How long, oh, God, how long will we continue?

COMMISSIONER CHONG: Henry, would you do me a favor, and we'll just not get into the deep details of kid-vid.

MR. GELLER: You're right.

COMMISSIONER CHONG: This is a different proceeding.

MR. GELLER: You're right, and I apologize.

COMMISSIONER BARRETT: I guess I won't pursue my questions, then, if we don't want to get into kid-vid. I was going to ask what do you do with the two to three percent money and why not put it in children's programming. But let me get away from that. I didn't open it up.

CHAIRMAN HUNDT: I hate the way you keep raising it all the time.

COMMISSIONER BARRETT: I think Henry makes a very good point, and I will stop just short of the kid-vid stuff by saying -- and I think you know my feeling; there is nobody up here that disagrees that we would not like to see more, and I agree with Commissioner Chong that this probably

isn't the place to discuss it, but I think absolutely everybody up here agrees with that.

MR. GELLER: I'm sorry I got into it, sir.

COMMISSIONER BARRETT: That's all right. Don't worry about it, but I think that our only problem is how do we get there. I think the Chairman is absolutely right -- we'd like to see more. How do we get there? I don't know how to do that.

Now, having said all that, Mr. Chairman, I will -- and I didn't want anyone to think I was gone, but since we started this some months ago, not this particular one today, I had made appointments, but I was watching you on television. They had some chairman of some telephone company out of Chicago called Ameritech that wouldn't stop talking. He's almost like Henry.

Let me do this, Mr. Chairman, before I -- as Ann Margaret says, there is a thing called the hole theory, and the more you dig, the deeper you fall in. Why don't we go to the -- what do you call it? -- the "free for all."

CHAIRMAN HUNDT: Free for all.

COMMISSIONER BARRETT: I'm trying to get out of this. I don't know how to get out of this. I don't have a shovel.

CHAIRMAN HUNDT: Isn't one answer to question that

I earlier was kicking around with John is that broadcast is different than our other medium precisely because it does have a public interest component with it and also because very cunningly somehow we've stumbled on a medium where the public doesn't have to pay; the other group pays, namely, advertisers, to create a public good? Those strike me as two distinctions between broadcast and telephony. I don't know whether you'd buy into those, John.

But I wanted to kick out the following, which is whether we assign licenses or whether we auction them, whether we give them away or whether we auction them, whether it's broadcast or something else, isn't it possible for us under all circumstances to condition them so as to have the license holders be obligated to meet some public interest? Isn't that what we do when we have built-out requirements for some licenses so that they will create universal service conditions?

Couldn't we have conditions of certain kinds of programming on broadcast licenses? I'm not saying the conditions would necessarily be exactly the same with respect to all licenses, but can't we have conditions on licenses to serve the --? That would be what I would like to throw out for you to kick around, if you wish.

Now, Henry, you can't go first because it's not

fair. You will have to let somebody else.

MR. GELLER: That's fine.

CHAIRMAN HUNDT: But then you get the rebuttal, unless we get someone -- Mark?

MR. CROSBY: It would be hard -- I'm trying to get a handle, Mr. Chairman, on what the public interest would be, per se. I can come up with one. There are major companies, power companies, for example, that use their radios intensely for nuclear power reactor plants and things. I think you would want to put on that license: Make sure you don't let anything escape or anything. Make sure that the pipeline doesn't leak.

CHAIRMAN HUNDT: A no-escape clause.

MR. CROSBY: A no-escape clause. Insofar as providing, say -- it's hard to measure, say, critical industries, those types of industries what they contribute to the public. It would be hard to put that on a license, but it's occurring. These are externalities that are very hard to define for our specific industry. It's easier for some of the other industries here, but a little bit more difficult for us, except for those unique circumstances.

COMMISSIONER BARRETT: Okay. Can I ask, just to follow up your question, Mr. Chairman, for one minute? Having left Illinois -- they ran me out of Illinois because

I left them with the highest amount of nuclear plants generation in America, none that came in under 955 percent cost overrun. Tell me again how you determine through the spectrum technology use-of-spectrum leakage?

MR. CROSBY: Use of spectrum --

COMMISSIONER BARRETT: You said that the way you could tell whether or not there was leakage or something.

MR. CROSBY: Oh, no. I was just trying to answer the Chairman's question on how you would measure or attach to a license authorization for a private, say, licensee or a critical industry how you would attach a public interest clause on that authorization, and I maybe my attempt at being humorous wasn't -- it's hard to do in our industry.

COMMISSIONER BARRETT: How would you attach that to the electric industry? Would you charge them something different?

MR. CROSBY: Charge them something different. Perhaps. I'm probably the wrong person to speak on behalf of the utilities.

COMMISSIONER BARRETT: Okay. And I apologize. I think maybe I took your comment. I don't have a sense of humor, and I probably took it too seriously. And I do apologize.

CHAIRMAN HUNDT: Jim, did you want to respond to

that topic I was trying to kick off?

MR. GATTUSO: Sure. Your question is should we or can we put a public interest requirement on these licenses; yes, of course, you can. The question is, should you, and it seemed like that's the system we've been trying, the system that exists now, and I think the first problem is, as Mr. Crosby mentioned, he started out by saying I'm not quite sure how you would define the public interest.

Well, this Commission has been trying to define the public interest for 70-odd years now and still hasn't answered the question. It's simply a system that hasn't worked. I think if you look at broadcasting versus cable right now, we have public interest requirements on broadcasters, and we still have consistent problems with quality. People were talking about how children's television was coming across to the public.

You have cable as an alternative that does not operate under a public trustee model, is providing more services, things like Arts & Entertainment Channel, Discovery Channel, CNN, and people are paying for it when they have the broadcast alternative. So maybe that's the model we want to go to to ensure the public interest, a more market-oriented model.

And the flip side of putting on a public interest

requirement or maybe another way to quantify it is to look at the value in the marketplace. A lot of it does come back down to that, and I know earlier we were talking about what would happen if you auctioned off the ATV spectrum and required HDTV broadcasting to be transmitted over that, and I think the response to that question was you could do it, but you wouldn't get a lot of money for it. Very few people would pay large sums of money.

Maybe that tells us something. If the value of the spectrum goes down from, whatever, ten, $20 billion to one billion dollar if you require a certain type of service to be performed, maybe that should lead us to reevaluate that service.

CHAIRMAN HUNDT: I'm sure those are precisely the conditions that John was imagining in his hypothetical, but just to stick back to the question of can't we condition licenses -- obligations, Henry, I think wanted to comment on that.

MR. GELLER: One on some of them, you should not. You can, obviously, but you shouldn't if it's -- it's highest use does serve the public interest, the most valued use in the private sector. But when you get to other ones, there are conditions. Even in cable there is no content requirement, but there is an access requirement for First

Amendment -- for reassociative -- principles in Section 612 and principles in Section 612 and Section 611, both access requirements.

In the common carrier area, you serve the public interest also by requiring the service differently which very much promotes First Amendment values and is totally content neutral.

And, finally, in the broadcast area, without going into detail, Commissioner Chong, in my statement I -- if you retain this public trustee concept, you ought to redefine it in the context of digital, and I suggest how you might do it in a different way than you do it today. I will not go into that detail here.

CHAIRMAN HUNDT: Let me just suggest, I don't think there is a question of "if," because I think you correctly stated that Congress has retained the public interest concept, that it is an obligation of this Commission to attempt to give it such meaning as we can. Many of the points you are making, Henry, are points that we all respect, but I think you'd be the first to say they require changes in the law as opposed to changes in the fashion over at the FCC.

MR. GELLER: Well, not the latter one that I referred to, because the 1996 Act says that when you go to

digital, you are still under -- they said nothing in it is to relieve you of the -- concept. The question is how do you define it.

CHAIRMAN HUNDT: I'm -- to agree with that.

MR. GELLER: The question is how do you define it.

CHAIRMAN HUNDT: Was there -- yeah. Mateo?

MR. CAMARILLO: I just wanted to emphasize it to your specific question about the public interest and conditions on the license. In light of the fact that minorities own less than 3.2 of licenses issued by the FCC, I think it's real important, especially for minority populations, to be able to receive certain kinds of information about events in their community to improve their life situation. So I really think it's important.

It's even more important to certain segments in light of the fact of the absence of ownership in those where you would expect to have -- for example, the statement was made earlier that people get their news from TV, that it is their number-one source. In the Spanish language, that's not the case because it's entertainment and not news. We don't get news in Spanish as their number-one source. So I think that has to be factored in.

CHAIRMAN HUNDT: Well, let me give you an example. If digital television is going to give us the opportunity

to have 50 standard-definition, digital channels in Washington, D.C., shouldn't we at least think about whether or not some of those should have Spanish-language translation on them or have a closed caption that runs in the Spanish language for the precise news shows that I think John and some others were talking about before, in fact, are very important to our country? Shouldn't that be the kind of debate we should be having about digital television -- auction issue?

MR. CAMARILLO: [Too close to mike.] -- that a better solution would be to have, you know, Hispanics and other minorities and women to be in the ownership position, so we would do it voluntarily.

CHAIRMAN HUNDT: Well, unless we would have to condition their licenses and say they would have to broadcast in Spanish, we would still have to worry about the output as well. I think I was cutting John off. I didn't mean to. Were you raising your hand over there?

MR. BLAKE: Well, it was the question before the last.

CHAIRMAN HUNDT: Go ahead. Take it back.

MR. BLAKE: Well, I was going to say that when you issue licenses for various services, those licenses do contain conditions as to the use -- broadcasting or PCS; it

may be broadly defined; it may be not so broadly defined. They also contain conditions with respect to power, height, location, mode of transmission, interference protection, and that whole web of licensing serves the public interest. It's been packaged together to maximize the use of the spectrum for the public interest. It includes both the allocation decisions and the licensing decisions.

CHAIRMAN HUNDT: But surely that web does not address all conceivable market failures, as Shelly was --

MS. SPENCER: I think we could add a "thou shall not" to the licenses, which should be "thou shall not discriminate," and I think the Commission has done that with the EEOC rules that it has and that it's looking at and continuing to apply, and that is certainly an important condition we shouldn't forget.

COMMISSIONER CHONG: Congress in the new telecom act has put in a "thou shall not discriminate" in Section 1 of the Communications Act. I note that.

CHAIRMAN HUNDT: If we do have conditions of any kind on our licenses, whether it's the ones you were talking about, John, or some of the others that we were discussing, shouldn't we aspire to articulate them clearly and specifically so that they are understandable in the marketplace and the license holders know what they are

getting, whether they got it by payment or by assignment. Comment?

MR. GELLER: Case law says that. In Greater Boston 444 F.2d, it says that administrative discretion at renewal should be confined by some standards, or the judge indicated it would really violate due process. There ought to be some guideline.

CHAIRMAN HUNDT: Anyone for vague, amorphous, unstated, invisible --

COMMISSIONER CHONG: Isn't searching for the public interest a little like searching for the Holy Grail? I mean, you want people to aspire to do the best, and you want them to have the flexibility to serve their community in the best way that is relevant to that community, whoever that community is. I just worry that I am no wiser than anybody else -- and I don't think you are either, Reed, and so who are we to say that my private notion of what is appropriate -- let them serve the way they should for their community. It varies across the nation.

MR. PERRY: Some without public interest obligation, but I think you would be hell pressed to not think that we weren't -- I mean, if you have a disaster like Oklahoma, you know, Southwestern Bell and AT&T, the two carriers there, were elbowing each other out to give away

phones to the rescue workers, manning facilities night and day. We are wiring 100 schools as part of AT&T's $150 million commitment for the Learning Network.

So -- and I think that comes as a result of working with you. You've let us know, as a matter through your staff, what you expect of us, and we think we are ahead of where you even expect of us. But I think that's worked. I think we've tried to have a public -- operate as if we have a public interest standard, and I think we've done a pretty good job.

COMMISSIONER BARRETT: I have to go back to something. I didn't understand your position on Southwestern Bell, and -- there was nothing wrong with that, was it?

MR. PERRY: Oh, we were the two carriers -- in Oklahoma City when the bombing occurred.

COMMISSIONER BARRETT: I know, but I'm trying to --

MR. PERRY: We were both -- my point was, Commissioner Barrett, both carriers showed up ready to help without compensation providing service.

COMMISSIONER BARRETT: Oh, I thought you --

MR. PERRY: No, no. They were just like us there ready to help, both carriers in every instance. It's not

one carrier; it's both carriers.

CHAIRMAN HUNDT: Did you want to --

COMMISSIONER NESS: I was going to switch gears. Does anyone else want to comment or ask questions --

COMMISSIONER BARRETT: No, but you and I just gave the Chairman the vote that he needed. He is wiser than most of us, so you got three -- do you vote for yourself?

CHAIRMAN HUNDT: You bet, always.

COMMISSIONER BARRETT: We are probably reaching a low ebb here, Mr. Chairman.

COMMISSIONER NESS: I don't think we've had notice and comment, but that's okay. I did want to switch gears just a little bit, and I was intrigued by something in your statement, Mr. Perry, that appeared, at least in my quick reading, to contradict something that was discussed in the last panel.

So I apologize to go back a little bit further than one would perhaps would want me to do, but we had discussion about how much flexibility to provide and how much flexibility to provide in the context of auctions, also in the context of incumbent users. And if I recall your testimony correctly, I think you were the one that said that auctions -- that one should not give spectrum --, I think was the term. Am I correct that this was you? I'm trying

to recall.

MR. PERRY: We believe very much that once you grant spectrum to --

COMMISSIONER NESS: That they should not have additional flexibility if they are already there.

MR. PERRY: -- should give maximum flexibility.

COMMISSIONER NESS: That you should?

MR. PERRY: Yes.

COMMISSIONER NESS: To incumbent. In other words, to say to those who already have licenses under the old system from previously being licensed where they did not go to auction, that they should get the benefits of additional flexibility without going back to an auction process. Is that right?

MR. PERRY: As Jim mentioned, we had auctions back then; we just didn't pay it directly to the federal government.

COMMISSIONER NESS: Okay. So that we should -- then maybe you are consistent with what transpired in the last panel, which is basically where we do go to flexible use to give everybody, incumbents as well as future auction bidders flexibility of use but within the service realm.

MR. PERRY: I think would could argue if you granted a service for one particular use and they want

flexibility to completely change what they are doing, then you have a right to say is that within the ambet of an extension of flexibility. But certainly, for example, in the cellular area, where you've granted cellular licenses by comparative hearing, you now give flexibility to PCS. Should they be under the same regime? Yes.

COMMISSIONER NESS: Okay. But they should not be given total flexibility to provide something totally outside the spectrum of CMRS, for example.

MR. PERRY: I think that they should have maximum flexibility under that very broad definition of CMRS.

COMMISSIONER NESS: Okay. Thank you. That did help to clarify. I thought that there was a discussion that you were drawing with incumbents versus new players coming in by auction. Thank you.

CHAIRMAN HUNDT: It seems to me that it's time to hit the road here. All that's been needing to be said has been said and then some more as well, and it's been very interesting and illuminating. I want to thank everybody very much. Again, I want to compliment Commissioner Ness on having got us all to make the commitment of time. I think it's paid off very well for us. Thank you very much, everybody. Off the record.

(Whereupon, at 4:49 p.m., the hearing was

adjourned.)

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