

1 technology and policy. My personal view is that
2 those two actually go hand in hand. In order to
3 make spectrum efficient and to have efficient use
4 of that spectrum, you have to have policy rights as
5 well.

6 Thank you.

7 MR. SIDDALL: I'm Dave Siddall. I have
8 also have worked a lot with regulation and
9 technology, putting the two together, actually. I
10 spent the first 13 years of my working career down
11 on Capitol Hill where I specialized in
12 communications at an organization called the
13 Congressional Research Service. That meant that I
14 was the resource for any question coming into any
15 Senator or Congressman or committee staff
16 regardless of parties or nonpartisan organization.

17 If they didn't know how to answer it or wanted to
18 have expert advice, they often referred it to the
19 Congressional Research Service. If it had
20 something to do with communications, it came to my
21 desk.

22 I think I would date my initiation to
23 this subject to that time, two decades ago. One of
24 my clients was the -- and often in touch with me
25 was the Chairman of the Senate Subcommittee on

1 Communications and there was a period during which
2 he was sending me these constituent letters that
3 kept coming in about I have this new idea, this new
4 service, the FCC is a roadblock, they're not
5 allowing me to find some spectrum to initiate my
6 service. And we had back and forth with the FCC
7 staff and with his staff and I met with his
8 constituent. Finally, after about a year, he
9 called me up one morning. We didn't have Caller ID
10 in those ideas so I actually answered the phone and
11 he said I just got this letter from the Chairman of
12 the FCC and this had been going on for two years
13 now and the letter says there's no more spectrum.
14 And if I can find it, my constituent can have it.
15 So what are we going to do, David?

16 Actually, one of the things that did
17 come out of this a year or two later was Section 7
18 of the Communications Act which was I think the
19 first attempt to actually address this issue. And
20 it was put in by the Senator behind the scenes
21 because it was an Omnibus Budget Reconciliation Act
22 of 1982 that inserted it. And it said that the FCC
23 shall rule on any requests for new technology
24 within one year and if it doesn't rule, the
25 technology shall be authorized. Easy said. We

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 kind of look at it back then as this will be
2 interesting and the history of that is it's very
3 difficult to implement.

4 Ten years later, I came here to the
5 FCC. Ten years later, actually, I was the Chief of
6 Spectrum Allocation and in some regard in charge of
7 making sure we complied with that very statute, so
8 every good deed is returned.

9 (Laughter.)

10 We also have the pioneers' preference
11 and I think that would be the second major blip on
12 the historical chart of attempts to find ways of
13 getting technology out to the marketplace. I
14 cannot take any responsibility for that. I was in
15 charge of administering it. I came into my job one
16 month after the Commission had adopted the rules on
17 that. So I had nothing to with its formation, but
18 I had everything to do with trying to carry out
19 that rule.

20 And as many of you know, during my 13
21 years here at the Commission, as I spent 13 on the
22 Hill, 13 here at the Commission, the job from which
23 I retired was the wireless advisor, media advisor
24 to Commissioner Susan Ness and again, we dealt with
25 spectrum.

1 And again, in case you want to put too
2 much weight on anything I say this morning, I have
3 to tell the story that when I first met her to
4 brief her on the PCS which we were in the middle of
5 a rulemaking on Personal Communications Service,
6 she was asking me how this all operated. This is
7 not a job interview, but a regular, you know, I'm
8 going to be a new Commissioner type interview.
9 When I explained it to her, I said there's one
10 thing to remember, in spectrum decisions, there's
11 50 percent of the parties are going to be really
12 mad and 50 percent really happy. So what you want
13 to do as a Commissioner is we'll brief you on it,
14 but we'll take the hit on the staff, we'll do it as
15 a staff-delegated action with your knowledge of
16 what we're doing. You'll never have to deal with
17 it and you don't want to because it's very messy.
18 And because I was very wrong with that and now the
19 spectrum issues are way up in elevation.

20 I wanted to say two points and then
21 I'll shut up and turn it over. One is if the
22 results of this task force is something like one
23 size fits all, I can guarantee you it's wrong.
24 There is strength in diversity. There are many
25 different types of services, many different uses of

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 spectrum and the real trick here is to somehow
2 accommodate all the different uses under some
3 regulatory scheme at 10,000 feet, but to make sure
4 that when you get down into the details, that the
5 diversity is still there and I think that requires
6 some differences in regulation.

7 I would draw the direct analogy to
8 property rights. I own a house out in Great Falls.

9 I wouldn't be here today. I would be really
10 retired and a multi-millionaire if I could -- it's
11 a two acre piece of property. If I could just take
12 that one acre and put a McDonald's on one end
13 because we don't have a fast food restaurant within
14 10 miles of where I live that's decent, if we could
15 put McDonald's on one end and maybe townhouses on
16 the three quarters remaining acre, I'd be very
17 rich, but there's zoning requirements that go with
18 that property. There's rights of way. I have to
19 be careful when I dig because there's electrical
20 lines and gas lines and cable TV lines going
21 through that property. So when we talk about
22 property rights in the abstract, it sounds very
23 good, but when you really look at the details of
24 property rights that are what we have today, there
25 are different rules that apply and I think the same

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 thing probably will apply to spectrum in the end.
2 And we just have to keep that in mind because some
3 people use the property rights rubric to mean no
4 regulation at all.

5 Now at least my experience in land
6 ownership or at least I inhabit some land that my
7 mortgage company owns, is that there's a lot of
8 restrictions on what I can do. I hope the spectrum
9 property rights actually will be a little less
10 restrictive than my property rights.

11 The second thing is when you get all
12 done your recommendations, I would urge you to take
13 one last look at the package and see if there is a
14 self-adjusting mechanism so that changes in
15 technology and spectrum use can be accommodated
16 with either minimal or no additional regulatory
17 action because it's very easy to lose that point,
18 to come out with a lot of different proposals, but
19 when you do the final look at it with that in mind,
20 you say well, what have I done? I've just written
21 a new set of regulations that fit today's
22 technology. The paradigm shouldn't be to fit
23 today's technology or yesterday's technology or
24 even tomorrow's technology. The paradigm should be
25 I don't know what's coming down the line. Is there

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 a way that those who use the spectrum can adjust to
2 the new technologies without the delay that is
3 inherent in governmental action.

4 Thank you.

5 DR. REED: Hi, I'm David Reed and I'm
6 not currently full-time with anybody. I'm an
7 independent consultant, although I do have
8 affiliations with the MIT Media Lab and with
9 several other organizations.

10 I'm basically a systems designer,
11 mathematician, computer scientist and a sometime
12 person who's taught himself economics, at least as
13 far as it applies in my field. My career started
14 out at MIT as a student and professor and wandered
15 through 10 years in the personal computer industry
16 where I, among other things, was Vice President and
17 Chief Scientist at Lotus Development for 7 years.

18 In my student days at MIT, I was
19 involved in the initial design of the internet
20 protocols which was a distributed process across
21 the country and I represented MIT in that effort
22 and I probably am best known in that time for some
23 architectural principles that have characterized
24 the internet, in particular, the end to end
25 argument which I co-authored with Jerry Salzer and

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 Dave Clark.

2 I think this is a very interesting
3 proceeding. I was especially hardened by
4 Commissioner Pell's remarks where he seemed to put
5 everything on the table and recognized a tremendous
6 economic opportunity that we face or economic
7 challenge and my feeling is that the challenge we
8 face is very similar to the challenge we faced in
9 the early days of the internet back in the 1970s,
10 25 years ago when I was involved, recognizing that
11 we didn't know what the best applications were, but
12 we knew that this new architecture was going to
13 support a very rapidly growing activity and one
14 that it would be foolish on our part to try to
15 predict what was going to happen. Instead, we had
16 to open up the opportunity for lots of innovators
17 and lots of developers. And the end to end
18 argument was part of the architectural argument to
19 enable that very flexible model which I would point
20 out had nothing to do with property rights.

21 I'm a great fan of Coase, but not
22 because of his FCC paper per se although it's well
23 reasoned, given what he knew about at the time, but
24 I am a great fan of what he won his Nobel prize for
25 which is the argument about when you introduce

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 transaction costs everything flies out the window
2 and it's that part of Coase's argument that I
3 support and I think it turns out in the long run
4 and I will argue that his argument about the FCC,
5 while historically interesting was incorrect in the
6 technical basis for it and therefore needs to be
7 revised.

8 I think at the same time, Claude
9 Shannon who is one of the greats formulated the
10 problem much more, in a much more interesting way.

11 He recognized that spectrum was not the resource.

12 Wires were not the resource. Bits between
13 communicated entities was the resource that needed
14 to be managed or increased and it turns out that
15 many years, now about 70 years or not quite 70
16 years after the current 1934 Act was based on an
17 incorrect understanding of how a radio works, we
18 are finally starting to understand how to apply
19 Shannon's understanding of information to radio
20 networks and discovering that, in fact, there not
21 only is scarcity artificial from regulation, but
22 the scarcity of communication capacity and other
23 economic utility in the spectrum and has very
24 little to do with spectrum as a resource and has a
25 lot to do with architecture and innovation.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS

1323 RHODE ISLAND AVE., N.W.

WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 In particular, the notion of
2 interference, that we know and love, it's been
3 enshrined in the law is extremely poor and even
4 Coase recognized that in his famous example of the
5 confectioner and the dentist where he talked about
6 the idea of a dentist that was disturbed by the
7 neighbor which was a confectioner generating large
8 amounts of vibration that made it very difficult
9 for him to carry out his activity. What Coase
10 pointed out in some of his writings was that it
11 wasn't just the confectioner that was responsible
12 for that interference. It was the dentist for
13 choosing to locate himself where he was and he
14 could equally well take the burden of minimizing
15 that interference. And that's very analogous to the
16 receiver exercise that we talked about earlier.

17 So with that, my main point is and I
18 will stand up for it today that the idea of a
19 commons based architecture where the market is in
20 the equipment and tool providers space is a much
21 better model for regulating radio than the model
22 that somehow all the goodness of radio coming from
23 the electromagnetic ether and therefore all
24 economic returns should go back to those who hold
25 artificial licenses. So thank you.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 MS. RATH: Okay, we're now going to
2 move to the interactive portion of the morning. I
3 just want to state for the record that I am a wonk,
4 not a nerd, but -- Paul will be the nerd in the
5 moderating session.

6 (Laughter.)

7 What I'd like to do is begin with a
8 sort of an over arching question, that basically is
9 the question of this workshop which is how does the
10 so-called lack of access to spectrum, not
11 necessarily spectrum, spectrum scarcity, but lack
12 of access to spectrum impede technology
13 development? And the basis for that is we sort of
14 talked through this issue is that some contend that
15 all valuable spectrum has already been assigned,
16 has already been licensed and thus is an impediment
17 to the development of new technologies that might
18 be seeking a corner of spectrum. Others have
19 actually contended that, in fact, this very
20 scarcity drives people to innovate and drives for
21 more spectrally-efficient use of the spectrum and
22 may actually, in fact, lead to some sorts of
23 technology innovation. But then as you sort of
24 look on the new frontier and we talk about things
25 like SDRs, you talk about possibility of spectrum

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 holes and the ability to fill spectrum that may not
2 even be used even though licensed.

3 What I'd like to do first is just ask
4 Dr. Reed and Dr. Farber to sort of talk briefly
5 about this, with maybe some follow-up by Dr. Fette
6 and Rittenhouse and then obviously can join in that
7 they want to, but I wanted to sort of start with
8 the two of you on sort of defining the question.

9 DR. REED: Sure. Actually, there are a
10 couple of things I'd like to point out. First of
11 all, the idea that there's a possibility of
12 spectrum holes, is a funny way to phrase it, in
13 fact, if you actually look at the available
14 capacity of the spectrum, even with today's
15 technology, there's a huge amount of capacity
16 wasted by very high powered transmitters and a
17 variety of other technologies that might have been
18 the best you could do in their time.

19 We have, if you -- there's the famous
20 example if you take a spectrogram of the radio
21 spectrum in any point in the United States, you'll
22 find that it's 99.999 percent unused by anybody and
23 actually, if you look at a second order point, is
24 that if you actually look around for places where
25 the spectrum is used, and you look at the --

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealgross.com

1 whether there are any receivers there, for example,
2 to receive the signal, you'll find that there's
3 almost no receivers there. So what we actually
4 have is a vast desert. It's all hole and very
5 little use.

6 Nonetheless, if you try to use any of
7 it you run into government-granted rights that will
8 be used against you if for nothing else, as Dr.
9 Powell heard, Commissioner Powell mentioned, to
10 keep you from being a low-cost competitor. So
11 that's the first point.

12 The second point is that we've in the
13 last 10 years including technologies such as ultra-
14 wide band which I had a little bit of involvement
15 with back at Interval Research, software-defined
16 radio which several on the panel know a great deal
17 about and radio networking which started out with
18 packet radio networks developed by DOD and have
19 evolved well beyond that which provide a kind of
20 gain called cooperation gain. That is if you house
21 several transmitters and receivers cooperating in a
22 system, you can get a lot more effective bit
23 capacity.

24 All of those things mean that we're in
25 the current situation getting almost no effective

1 communications out of our totally allocated
2 spectrum and since the technology is available now
3 to do that, we need to find ways to enable that
4 technology.

5 MS. RATH: Dr. Farber?

6 DR. FARBER: Thank you. It's always
7 difficult going after Dave. He says a lot of what
8 I wanted to say, but let me emphasize two things.
9 I remember talking to Paul Baron once sitting in
10 his living room as he was scanning the spectrum.
11 For those of you who don't know Paul, he was a
12 force in many, many areas of both radio and
13 probably the one who originated packet networks.
14 And the spectrum is largely empty. And part of our
15 problem is it's like going to parts of the United
16 States back in the old days where nobody was
17 around, the land was empty, but there were barbed
18 wire fences all over the place and if I dared walk
19 into your property, I'd have to go through the
20 barbed wire and once I got there, somebody might
21 shoot at me. As opposed to the world that exists
22 in other parts of the world where I have the right
23 to walk across your property, provided I don't
24 meaningfully interfere with you. And I think that
25 term "meaningfully interfere with you" is a key

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 word. We talk about interference in some abstract
2 sense. I guess if there's nobody in the forest who
3 will hear the falling stone, if there's nobody
4 using the spectrum, and I use it, I'm not
5 interfering with anybody provided I get out fast
6 enough when they want to use it.

7 We're at an era where the technology
8 allows that and I think that's the key. It's a
9 combination of software-defined radios which give
10 us the flexibility. A lot learned from the
11 internet. The internet and its development taught
12 us a lot about how to deal with cooperating, almost
13 friendly, sometimes hostile units working together
14 for a common good. There's a lot to be derived out
15 of that which has not been applied to radio space.

16 There are some examples in the past and
17 if you separate technology from commercial success
18 I aim you at a system that again Paul Baron built
19 called Ricochet for Metricom which was a marvelous
20 example of a very efficient use of a limited
21 bandwidth with cooperating radios and in fact,
22 probably was the first example of mesh radios in
23 existence.

24 We have the technology. I think we
25 have an understanding of how to apply it. But it's

1 not an overnight thing. We've ignored this area
2 for a long, long time. There's been precious
3 little research done in the area.

4 DR. FETTE: I'd like to open with the
5 following observation. First of all, many folks
6 have paid dearly for a chunk of spectrum for which
7 they expect to be granted a certain quality of
8 service and I think the reason those people defend
9 that chunk of spectrum is that they feel that they
10 have the responsibility to protect the customers
11 that they serve with a certain degree of quality of
12 service.

13 An example that's particularly
14 illustrative there might be the public safety
15 service sector in which while the spectrum is not
16 used highly, when the need arises to use the
17 spectrum to communicate, they certainly don't want
18 to have interference.

19 The example of the software-defined
20 radio which could in principle do a CSMA type
21 collision recognition and recognize opportunities
22 to use available spectrum implies that such things
23 are possible as spectrum sharing.

24 It's important in such cases to be able
25 to get off the air as soon as the spectrum is

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 required by its primary user and to assure that the
2 quality of service is not degraded in any way for
3 those users.

4 The example of public service is
5 perhaps a little bit easier to deal with than the
6 examples of satellite communications where it's
7 difficult to recognize when communications is
8 actually going on.

9 The principles of an SDR-type system
10 with specified set of protocols and I think we can
11 expect that the protocols will advance in
12 sophistication and complexity and that the SDRs
13 that implement them will advance in sophistication
14 and complexity as time marches on.

15 I'd like to, in particular, point out
16 that the technology advances both by virtue of a
17 resource need and in the case of spectrum a
18 resource need has been recognized, but also for
19 other reasons other than spectrum resource. In
20 this case, the SDR advances because the technology
21 allows it to advance to the point where we can do
22 so much more than was originally expected of a
23 radio, for example. We can do multimedia source
24 coding, web browsing and such things and because
25 the technology allows it and allows it to become

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 economical at some point, then those who recognize
2 that point of inflection jump in with an attempt to
3 demonstrate those technologies and subsequently to
4 demonstrate business opportunity deriving from
5 that.

6 MS. RATH: Gee?

7 DR. RITTENHOUSE: Yes. I take somewhat
8 of a different view, although I freely acknowledge
9 that unlicensed spectrum and interference avoidance
10 has its place for a crucible and the test tube of
11 new technology development. I also want to
12 acknowledge the fact that in the property rights
13 model, because of the expense that has been put
14 into that spectrum, we have also seen an evolution
15 in spectral efficiency. In my field of expertise,
16 the cellular communications, we are seeing a
17 constant migration from amps to digital to now
18 we're just rolling out 3G technologies and beyond.

19 And so the fact that there are -- that spectrum is
20 a finite resource or high quality spectrum is a
21 finite resource also puts economic pressures to
22 push towards higher, more spectrally efficient
23 solutions detect and collision avoid type methods
24 in the internet also allows for a multiplexing gain
25 among users. And so within a particular spectral

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 band, you do get a packing efficiency. But if you
2 look at some of the WiFi, particularly the more
3 recent ones, type technologies, they are horribly
4 spectrally inefficient compared to the 3G
5 technologies and the corresponding shared high
6 speed data channels and those type of technologies.

7 To Professor Farber's point of
8 Ricochet, Ricochet largely failed, not because of a
9 technology point of view or an efficiency point of
10 view, but from a coverage point of view and the
11 lack of ubiquitous service. A provider has to be
12 able to predict in that present value of their
13 deployment of the infrastructure that goes into
14 that spectrum. And if they're not guaranteed that,
15 or not able to predict it, then rolling out such a
16 service is very difficult.

17 Thank you.

18 MS. RATH: I think a couple other
19 people wanted to comment and then we'll go to the
20 audience for some questions.

21 Steve?

22 MR. SHARKEY: Dr. Farber used an
23 interesting term and looking at meaningfully
24 interfering with an incumbent. And I think that's
25 a key to this is when you're allowing new

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 technologies and we do have to have room for new
2 technologies, but that's what a lot of the debate
3 has been about is when are you interfering with the
4 incumbent and more often we see in the FCC
5 rulemakings the term "harmful interference." So
6 whether you're talking about harmful interference
7 or a meaningfully interfere, it's often a very
8 different idea of what that means, depending on
9 whether you're the incumbent or the new service
10 provider or the new entrant.

11 And that's probably one of the key
12 areas that I think the Commission can really work
13 on is to try and provide a better definition of
14 what "harmful interference" or "meaningfully
15 interfere" is to better define those, the rights of
16 the incumbents, to provide the certainty. That was
17 a lot of the debate about the introduction of
18 ultra-wide band technologies is whenever there is
19 any introduction of a new technology that's going
20 to overlay or impact or use the same spectrum or
21 adjacent spectrum, there's going to be some impact
22 so I think getting the certainty about what level
23 of impact an incumbent has a right to expect or
24 must be expected to live with is one of the
25 critical things that would ease the path of the

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 introduction of new technologies and get around
2 some of the debate that goes on. And that allows
3 some of the innovation that Gee was talking about,
4 the certainty for innovation in license services
5 while also allowing introduction of some of the new
6 services or new innovations.

7 MS. RATH: Thanks. Peter?

8 MR. PITSCH: First, I want to say Intel
9 does support creating more common spectrum and I
10 think the noninterfering easement idea that
11 Professor Farber has suggested has merit and I am
12 going to argue that these approaches, the rights
13 approach and the commons approach are
14 complementary. Not only do they co-exist, they are
15 complementary. But as the Commission looks at the
16 issue of commons versus rights, it needs to look at
17 three factors: first, scarcity; second,
18 transactions, costs; and third, practicality. I
19 think the third point has been woefully ignored.

20 Professor Farber and Faulhaber have
21 laid out the importance of transactions costs and
22 scarcity. When we talk about scarcity it isn't
23 enough to say well there will be no interference.
24 The 2.4 gigahertz allocation had a very low
25 opportunity cost for low power uses, right? We all

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 know why, microwave ovens. Similar arguments were
2 made at 5 gigahertz. The nonlicensed PCS spectrum
3 had a much higher opportunity cost, okay? So as
4 the Commission thinks this through, it needs to
5 consider scarcity. Transactions costs cut
6 differently too. You can make a very compelling
7 argument for ultra-wide band that the transactions
8 costs, buyers and sellers getting together, are
9 quite high. So the Commission was quite right to
10 do that. For agile radios and mesh networks, the
11 transactions costs arguments are much weaker.

12 Now just briefly on the proctocolitis
13 point, again, I think the Commission was wise to go
14 forward with ultra-wide band, but let's realize
15 that we live in a real world here and that that was
16 a very long process and many people believe came up
17 with very conservative criteria. What if the
18 alternative for agile radios, the efficiency
19 alternative is not to limit them to two
20 microseconds. Maybe it's different. Maybe
21 equipment costs or the quality of service could be
22 much higher. What if that happens much faster if
23 you have a rights alternative for radio technology
24 to be deployed? What if it happens in a much more
25 efficient way? So again, complementary.

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 Also, nontrivial questions about
2 squatters' rights. What if we create agile radios
3 and yes, they have to look before they transmit and
4 then get off and then we give flexibility to the
5 incumbent user and they come up with a new
6 technology which means that they're occupying the
7 spectrum much more often and we have all these
8 agile radios up there counting on the fact that
9 they've in the past always got access or got access
10 quite often and no longer can. Is the Commission
11 going to have the credibility to deal with those
12 problems?

13 So we need to be very pragmatic in how
14 we move forward here as well, consider those
15 considerations.

16 MS. RATH: One more and then that's it.

17 DR. FARBER: I just wanted to add one
18 thing. Talking about technology for a moment. I
19 think we're going to see a very interesting thing
20 happen over the next year or so as cell phones come
21 out with almost everything in them. Qualcomm, the
22 chip now has Bluetooth, WiFi, everything and the
23 kitchen sink in it which gives you an interesting
24 environment, that one phone is very agile in a way
25 and how that develops in the marketplace is going

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 to be amusing, I think, is a nice term. You might
2 get some indication by the fact that DoCoMo is
3 going to spread WiFi all over Tokyo so they assume
4 a technology there and believe there is an
5 interesting market. How that develops I think may
6 give us a lot of insight.

7 DR. REED: Yes, I have a very brief
8 comment, since it will probably come up quite
9 often. This notion that there needs to be
10 certainty in order to support innovation is proven
11 wrong in several different ways. I'd like to point
12 out that in the semiconductor industry where huge
13 investments get made in the billions and nearly
14 trillions of dollars in new fab capacity, that is
15 based on a bit and based on a reasonable
16 expectation that somehow those things will be able
17 to be used, but it's not based on a guarantee of
18 return, especially not one provided by some kind of
19 government grant of rights to a market.

20 So I think that might be a red herring.
21 And in general, and my experience with the
22 internet leads me to believe this, the most
23 efficient economic architecture is the ones that
24 actually support the most innovation, are the ones
25 where there's the most uncertainty about the future

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701

(202) 234-4433

www.nealrgross.com

1 payoff, so while it may not be comfortable for
2 people to invest in either licenses or new
3 technologies without certainty, that's the game
4 we're in especially with the technology rate of
5 change and the government shouldn't try to make
6 those investment payoffs. Let the investors do
7 that.

8 DR. KOLODZY: Thanks. What I'd like to
9 do is we're on the area -- there are spectrum
10 scarcity issue to begin with and the second
11 question, this is a follow-up sort of was asking
12 the area of technology and how does technology
13 impact that? I'd like to turn it over to the
14 audience if there's any questions or comments
15 basically in that area or anything that the
16 panelists have commented on up to this point?

17 (No response.)

18 Well, if there isn't -- you do?

19 MR. SNYDER: Jim Snyder, New America
20 Foundation. A comment and then two follow-up
21 questions.

22 The transaction costs seem to be a
23 favored concept that economists have been using
24 frequently at this conference and I think it's a
25 good word, but I would encourage you to use

NEAL R. GROSS

COURT REPORTERS AND TRANSCRIBERS
1323 RHODE ISLAND AVE., N.W.
WASHINGTON, D.C. 20005-3701