

***COMMERCE SPECTRUM MANAGEMENT
ADVISORY COMMITTEE***

MEETING

05/12/2015

Agren Blando Court Reporting & Video, Inc.

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NATIONAL TELECOMMUNICATIONS &
INFORMATION ADMINISTRATION
OFFICE OF SPECTRUM MANAGMENT

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COMMERCE SPECTRUM MANAGMENT
ADVISORY COMMITTEE (CSMAC)

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MEETING

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TUESDAY
MAY 12, 2015

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The Advisory Committee met in the conference room of the National Institute of Standards and Technology (NIST), 325 Broadway, Room 1A116, Building 81, Boulder, Colorado at 1:30 p.m., Larry Adler and H. Mark Gibson, Co-Chairs, presiding.

PRESENT:

Larry Adler, Co-Chair
H. Mark Gibson, Co-Chair
Michael Calabrese, Member
Mark Crosby, Member (by telephone)
Mike Chartier, Member
Mark McHendry, Member
Audrey Allison, Member
Thomas Dombrowsky, Jr., Member
David Donovan, Member (by telephone)
Giulia McHenry, Member
Dale Hatfield, Member
Paul Kolodzy, Member
Robert Kubik, Member
Janice Obuchowski, Member
Robert Pepper, Member

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1 Carl Povelites, Member
Charla Rath, Member
2 Rick Reaser, Member
Jeffrey Reed, Member
3 Dennis Roberson, Member
Mariam Sorond, Member (by telephone)
4 Schaubach, Kurt, Member
Steve Sharkey, Member
5 Bryan Tramont, Member
Jennifer Warren, Member (by telephone)
6

7 ALSO PRESENT:

8 LARRY STRICKLING, Assistant Secretary for
Communications and Information and
9 Administrator, National Telecommunications
and Information Administration, U.S.
10 Department of Commerce

11 PAIGE ATKINS, Deputy Associate Administrator for
Spectrum Planning and Policy, National
12 Telecommunications and Information
Administration, U.S. Department of
13 Commerce
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1 P-R-O-C-E-E-D-I-N-G-S

2 1:30 p.m.

3 CO-CHAIR GIBSON: All right. Good
4 afternoon. I'm Mark Gibson. I'm co-chair, and
5 I'm -- It looks like everyone's here on time.

6 I would like to turn it over initially
7 to Larry. Larry, you can do your opening remarks,
8 and then we'll get to it.

9 ASST. SEC. STRICKLING: Thank you,
10 Mark. I also want to thank NIST for giving us the
11 use of this wonderful modern facility for our
12 meeting here this afternoon. Unfortunately, it
13 didn't come with a lot of parking, and so I hope
14 everybody was able to navigate through that.

15 So I tried to do my little part for
16 this. Some of you, if you drove around, may have
17 noticed that on the other side of the older
18 building, there's a parking space labeled "NTIA
19 Director." So being the gentleman that I am, I
20 dutifully got out and put a Post-It on it that
21 said "Emeritus" and stuck it under NTIA, but I
22 understand Janice still drove past the parking
23 spot and didn't take it, so my effort went for
24 naught. So there is an empty space down there.
25 People are still driving around trying to find a

1 place to park.

2 MEMBER OBUCHOWSKI: Larry, I am still
3 emeritus, but I just had cataract surgery, so I
4 missed that part.

5 ASST. SEC. STRICKLING: Also, I want to
6 welcome today students from the University of
7 Colorado. These are students in their second day
8 of May-mester with Professor Bryan Tramont -- boy,
9 that's a phrase I'd never thought I'd have to
10 say -- and Professor Dale Hatfield, which really
11 has more of an authoritative sound to it, a
12 Spectrum Management and Policy person.

13 And for those of you who don't know, I
14 guess -- Dale was telling me they basically pack
15 15 weeks of instruction into three weeks here, and
16 so that's quite a testament to you and to the
17 fortitude of your students that are here. But
18 they're sitting here behind us.

19 Do you guys want to stand up so we can
20 say hi.

21 (Applause)

22 ASST. SEC. STRICKLING: Yeah, I told
23 them out in the lobby that there would be a pop
24 quiz at the end of this, so we'll be taking
25 questions from you-all during the course of the

1 afternoon, and then Bryan and Dale will be putting
2 that into a pop quiz that they're going to give at
3 9 o'clock tomorrow morning when class resumes. So
4 they've been forewarned, and we do appreciate your
5 efforts in coming up with some good questions.

6 But we have already tested them, and I
7 have found that despite the fact there are a lot
8 of law students in the group, it's actually a
9 pretty smart group. Hey, I've got a law degree,
10 too, but I know of what I speak. So just as an
11 example, I was just testing, you know, at random,
12 some of you-all and some of the folks here, and
13 the students as well.

14 I think you-all know that you're out
15 here this week in connection with a conference
16 that NTIA and NIST have sponsored in the past.
17 And this year it's being sponsored by our Center
18 for Advanced Communications, the ISART conference.
19 So I started asking, "What does ISART stand for,"
20 and none of you guys know, but the law students
21 do, so -- Or Dale and Bryan's students know.

22 Savannah, tell us what ISART stands
23 for.

24 AUDIENCE MEMBER: That would be the
25 International Symposium on Advanced Radio

1 Technologies.

2 ASST. SEC. STRICKLING: See, they're
3 already --

4 MEMBER SHARKEY: She read it off a
5 piece of paper.

6 MEMBER PEPPER: Bryan taught her well.

7 ASST. SEC. STRICKLING: Yeah. So just
8 to let you know, you know, you can't pull any fast
9 ones on these folks. They know all the acronyms
10 and everything, so -- But, anyway, let's get on
11 with some more serious content today. We've got a
12 lot to talk about.

13 I'd like to just let everyone know that
14 the charter for this advisory committee was
15 reviewed -- renewed -- well, it was reviewed,
16 too -- renewed in March for two more years. And
17 my hope for the next two years is that this group
18 is able to be as productive as the previous CSMAC
19 was, because -- which, of course, engaged most
20 everyone here, but I think the accomplishments of
21 the last group, which we'll hear some more about
22 today as we hear reports, and hopefully final
23 reports from a number of the groups, the
24 productivity of this group has just been amazing,
25 and so I would like to see that continue as we go

1 on to even bigger and better tasks in the future.

2 But certainly the -- the work over the
3 last few years to get up to being able to do the
4 AWS-3 auction and the collaboration it required
5 between industry and agencies -- and all that was
6 done under the rubric of the CSMAC -- it's just a
7 real testament to the power of this group and what
8 you can get accomplished.

9 So we're looking forward to seeing the
10 group continue to operate at a very high level
11 here for the next couple years. And if we can
12 find something to top AWS-3, I think we'll all be
13 able to take a lot of pride in that.

14 Certainly one of the things that's now
15 teed up, an area in which -- and that already
16 reflects some of the work of this group, but I
17 think also provides ample opportunity for
18 additional new work, is the recent FCC order in
19 the 3.5 gigahertz band. Already I think we've
20 seen, in terms of the new way to think about
21 exclusion zones and coordination zones, providing
22 a test bed for sharing along the lines of the
23 priority access license and the general authorized
24 license in that order -- general authorized
25 access -- I'm sorry -- not license -- is

1 important, and it will give us a chance to try out
2 some new sharing techniques, specifically the
3 spectrum access system.

4 So the work of this group contributed
5 to that, and I think there will be lots of
6 opportunity to tackle additional challenges as we
7 see more how that's going to unroll.

8 As a quick update on the Center for
9 Advanced Communications, since we're here meeting
10 in Boulder, for our part at NTIA, we have hired a
11 director who starts on Monday. His name is Keith
12 Gremband. He's worked in this space before. He
13 worked at DARPA for a number of years, and he will
14 be on the ground here starting Monday.

15 Additionally, after a series of
16 negotiations, the Department of Defense, NIST,
17 NTIA and DOD have signed a memorandum of
18 understanding establishing what is being called
19 the National Advanced Spectrum & Communications
20 Test Network. What it really is, is hopefully it
21 will become a customer group open to other
22 agencies and open to industry to help set the
23 agenda and the plans for the capabilities that
24 NIST and NTIA will be able to offer jointly
25 through the CAC framework.

1 So we're anxious to get that going.
2 The next task is to get the charter developed for
3 that group and then to turn and invite other
4 agencies and eventually industry members to -- to
5 more formally join it. And then hopefully that
6 will be on its way in terms of getting CAC moving
7 forward and continuing to provide and finding new
8 ways to provide support to the needed research for
9 spectrum sharing.

10 So I know we'll hear a lot of other new
11 information today from everyone, and I'll turn it
12 back to our chairs, Mark and Larry, and we'll get
13 on with it. Thank you.

14 CO-CHAIR GIBSON: Thanks, Larry. I
15 have a few brief comments. It's great to see
16 everybody out here. We have a lot of work to
17 cover today. We're going to try to, Larry and I,
18 do what we can to keep people on track. So don't
19 hold it against us if we cut people off, but we
20 have a full agenda and we want to make sure we
21 cover everything. There's a lot of things to talk
22 about.

23 I would like to direct everybody's
24 attention to the dates. Starting today --
25 Actually, starting yesterday until the 19th, we

1 have palindrome days, which means the dates are
2 the same forward and backward. So for all the
3 geeks in the room, you can enjoy that for a while.
4 That and 20 cents will get you 20 cents.

5 That's about all I had. What I'll do
6 now is -- I'm here all week playing down in town.
7 Okay. I'll do the roll call now.

8 Rob, let's start with you and work
9 backwards.

10 MEMBER KUBIK: Rob Kubik, Samsung.

11 MEMBER SCHAUBACH: Kurt Schaubach,
12 Federated Wireless.

13 MEMBER ROBERSON: Dennis Roberson from
14 the Illinois Institute of Technology.

15 MEMBER ALLISON: Audrey Allison, Boeing
16 Company.

17 MEMBER MCHENRY: Mark McHenry with
18 Shared Spectrum Company.

19 MEMBER CHARTIER: Mike Chartier, Intel.

20 MEMBER REASER: Rick Reaser from
21 Raytheon.

22 MEMBER SHARKEY: Steve Sharkey,
23 T-Mobile.

24 MEMBER TRAMONT: Bryan Tramont, Wilkins
25 & Barker.

1 MS. ATKINS: Paige Atkins, NTIA.

2 CO-CHAIR GIBSON: Mark Gibson,

3 Comsearch.

4 CO-CHAIR ALDER: Larry Alder with

5 Google.

6 MEMBER OBUCHOWSKI: Janice Obuchowski,

7 Creative Technologies.

8 MEMBER CALABRESE: Michael Calabrese,

9 New America.

10 MEMBER RATH: Charla Rath, Verizon.

11 MEMBER HATFIELD: Dale Hatfield,

12 University of Colorado.

13 MEMBER REED: Jeff Reed, Virginia Tech.

14 MEMBER KOLODZY: Paul Kolodzy, Kolodzy

15 Consultants.

16 MEMBER DOMBROWSKY: Tom Dombrowsky,

17 Wiley Rein.

18 MEMBER POVELITES: Karl Povelites,

19 AT&T.

20 MEMBER MCHENRY: Giulia McHenry, the

21 Brattle Group.

22 MEMBER PEPPER: Robert Pepper, Cisco.

23 CO-CHAIR GIBSON: Thanks. Is there

24 anybody on the phone -- CSMAC persons on the

25 phone?

1 MEMBER WARREN: Jennifer Warren.

2 CO-CHAIR GIBSON: So Jennifer. I heard
3 that.

4 MEMBER SOROND: Mariam Sorond, Dish
5 Network.

6 CO-CHAIR GIBSON: Okay. Anybody else?

7 MEMBER CROSBY: Mark Crosby, EWI.

8 CO-CHAIR GIBSON: Okay. Any other
9 CSMAC members on the phone?

10 Very good. Thank you. Yeah, so that's
11 the membership. I would also like to recognize
12 Julie Knapp, who I think is in the back. Julie
13 was here -- I wasn't making that up -- because I
14 saw him this morning.

15 Okay. That's really all I have.
16 Larry, I'll turn it over to you.

17 CO-CHAIR ALDER: Okay. So I'm going to
18 use this mic. Does that work better? All right.
19 So we're going to go through today and cover the
20 subcommittees. Before we do that, I wanted to
21 give a few remarks about where we stand as kind of
22 an organization.

23 We've been in a mode where we've had
24 seven subcommittees working on the various topics
25 from enforcement to bidirectional sharing. We --

1 A lot of these topics have drifted over from the
2 previous CSMAC, and we're kind of in a mode where
3 I think we're very close to finishing up a number
4 of the reports from the subcommittees. We already
5 have three that have essentially been finished and
6 approved. Those include the spectrum database,
7 the bidirectional sharing and the transitional
8 sharing working groups.

9 So what we wanted to do today is --
10 We're going to hear, not for the first time and
11 not from all seven, but just from the four
12 remaining working groups; we'll get their reports.
13 I think a couple of them are ready to bring a
14 motion for approving of those reports,
15 specifically the enforcement and the industry
16 government collaboration committee.

17 What we'll also do, then, is spend a
18 little time talking about potential next
19 questions. So where I think we see this going is
20 once this group of work is kind of largely
21 completed, we'll take an -- we'll take an
22 opportunity to have some focus questions for this
23 next year, and then working with Paige and the
24 other folks at the NTIA, kind of bubble up what
25 are the priorities and how can we refocus this

1 group going forward. So we're a little bit kind
2 of finishing one group of work and we're going to
3 get ready to start up another one.

4 So before we go to the presentations,
5 what I wanted to first do is talk -- give the
6 chairs of the working groups that have closed just
7 a moment to comment on the status of that, because
8 the last time, I know, stuff was voted on and
9 approved.

10 So let me start with transitional
11 sharing and Mark.

12 CO-CHAIR GIBSON: I'll quote from MASH.
13 I have nothing to say, and I might add I have
14 nothing to add. That's what the thin air of
15 Boulder does.

16 I do need to finalize the report. I
17 haven't had a chance to do that. Maybe I can do
18 that while I'm out here in the thin air. There
19 are -- I know I went back and looked at it, and I
20 noticed there were just a few open items, things
21 like citations that needed to be filled in. I was
22 hoping to get that done.

23 Also, before Tom gets to it on the
24 industry and government collaboration, I also was
25 hoping to have something for that, but that didn't

1 get done. So mea culpa.

2 Anyhow, that's transitional sharing.

3 CO-CHAIR ALDER: I think with regard to
4 transitional sharing, we've all agreed that we're
5 not going to do future questions. That -- That
6 work is over. It's kind of been approved.

7 There's just some editorial stuff that needs to go
8 in. And then Bruce is going to be figuring out
9 the memorialization process for these reports.

10 I'll give the update for the Spectrum
11 Management via databases. We completed and we
12 voted on last meeting that report. The
13 agreed-upon language was incorporated and has been
14 forwarded to Bruce, so that's been effectively
15 wrapped up pending just the memorialization of
16 that.

17 So, Janice, do you want to talk about
18 bidirectional sharing.

19 MEMBER OBUCHOWSKI: As to bidirectional
20 sharing, we've successfully wrapped up the first
21 round and I think came forward with some very good
22 and constructive suggestions on a variety of
23 non-interference bases, short-term sharing
24 scenarios, whereby federal users could avail
25 themselves of commercial spectrum. It's probably

1 safe to say that there's quite a substantial
2 difference of opinion on our committee as to
3 longer term approaches, and we're looking to
4 guidance from NTIA in part on that.

5 And I guess I'll take the privilege
6 that came with the parking space to say that my
7 personal view here is that we're 16 years since
8 commercial users were given the flexibility to use
9 their spectrum in any way they saw fit going
10 forward. Consideration such as that flexibility
11 in a broader sense, rather than a narrow sense, is
12 going to be critical to federal users,
13 particularly in an environment where we see
14 spectrum and commercial spectrum being used for
15 very strategic military uses by unconventional
16 forces and conventional forces worldwide. So DOD
17 and other federal users will be looking for
18 broader policy approaches going forward, and I
19 think that should be a topic for discussion in the
20 next round.

21 I want to specifically recognize my
22 group, because it's been a very constructive
23 effort, and Charla Rath has been a superb, superb
24 lawyer. I give her my personal award for legal
25 prowess.

1 MEMBER RATH: Which, of course, I'm not
2 a lawyer, so -- That's a joke.

3 MEMBER DOMBROWSKY: That explains why
4 she's so good at it.

5 CO-CHAIR ALDER: And I think both the
6 spectrum database subcommittee and the
7 bidirectional sharing subcommittee have suggested
8 items for future work, and we'll talk about that
9 later in the agenda today.

10 So with that, let's turn it over, and
11 we'll have the report from the government
12 collaboration subcommittee.

13 Is that going to be Steve or Tom?

14 MEMBER SHARKEY: I think I'll do it,
15 and then Tom will correct me. So we have -- So
16 we've got a report that everybody was sent out a
17 couple weeks ago from the government and industry
18 collaboration subcommittee. We were assigned
19 three questions, and I think we've got -- Well,
20 we've got responses for each of those. And I'll
21 just run down the executive summary of the -- of
22 the report and recommendations.

23 So the first question was related to
24 what type of spectrum issues should NTIA
25 prioritize for enhanced collaboration, and we've

1 got a number of recommendations, a number of areas
2 where we felt that additional work would be --
3 would be helpful.

4 First, developing clutter and terrain
5 impact models. There was a lot of work done,
6 particularly during the AWS-3 proceeding or
7 efforts when we were working with government
8 entities to look at how to model particularly
9 different -- different situations, terrestrial to
10 airborne interference scenarios. And there was a
11 lot of work done on how to take into account some
12 pretty significant issues like terrain -- terrain
13 and clutter, that when they were left out of the
14 analysis, you had very significant interference
15 zones.

16 And -- So I think we found a way to
17 include them in the end that was a rough estimate,
18 but I think there's a lot of work that can be done
19 to move that forward and refine it as we continue
20 to look at more advanced sharing, which would be
21 beneficial. A lot of that work was really -- You
22 know, ITS did a lot of work on that, presented a
23 lot of that information. So I think helping to
24 develop that would go a long way towards future
25 efforts.

1 Enhance data protections. So one of
2 the -- Everybody's aware of the focus on spectrum
3 access database as part of a sharing effort. One
4 of the issues that always comes up and, in fact,
5 is there in the 3.5 gigahertz band, is you have to
6 make sure to input information and that it's
7 securely inputted and protected while still having
8 results usable by everybody. I think you guys
9 know that scenario can be further refined and
10 worked.

11 Develop and define procedures to model
12 interference impacts on a system-specific basis.
13 Again, kind of going back to the work done in
14 AWS-3, there was -- the interference impacts were
15 generally looked at as a threshold of increasing
16 the noise floor above a certain trigger or
17 threshold, but there was often not a good
18 understanding of what that really meant on a --
19 for the system and whether or not it was really
20 harmful interference or not.

21 And there was a lot of resistance to --
22 to doing further analysis on that, to look at what
23 are the real impacts and what should be a -- You
24 know, is there a different threshold that should
25 be used that would facilitate sharing and not --

1 while still making sure that it would not cause
2 harmful interference. So I think finding a way to
3 allow that to happen, have tests going on between,
4 you know, industry systems and government systems
5 to really look at what -- what the impact of the
6 interference is and to further refine that impact.
7 And as we get more and more interactive on
8 sharing, that would be an important part of it.

9 Enable security clearances. This is an
10 issue that comes up and has been coming up year
11 after year. How do we get to -- When -- If
12 we've got to have discussions where there's
13 classified information involved, particularly on
14 the federal side, there's not a good avenue right
15 now to do that.

16 One of the challenges is trying to make
17 sure that the industry folks are able to get
18 security clearances. You need a sponsor to do
19 that, and often what happens is there's a
20 willingness by an agency to sponsor an industry
21 person to help -- to help do -- facilitate the
22 discussion and the analysis, but the reality is if
23 you start down that road and clearance takes so
24 long, you -- the analysis will be done before you
25 can get clearance. So we need some way to get in

1 on the front end, a process where we can get
2 clearances and have people that are able to engage
3 in these broader discussions collectively.

4 And then identify additional spectrum
5 bands and prioritize identifying additional bands
6 for enhanced collaboration through the framework
7 process. There's a list that NTIA has developed
8 over time, as well as teed up, and prioritizing
9 those will help to focus some of the discussion.
10 And that would be a useful exercise.

11 I don't know, Tom, if you want to add
12 anything else on that.

13 MEMBER DOMBROWSKY: Just on the enable
14 security clearances, I think that's the only issue
15 that we sort of still think will be outstanding
16 after this report gets finalized. We have some
17 information from Bryan and some information from
18 Mark, and we'll put that together with the report,
19 probably have another meeting or two with some
20 outside experts and report back to the committee
21 our findings on helping to enable the security
22 clearance process hopefully going forward.

23 MEMBER SHARKEY: Right. So we were
24 hoping this report will be forward for a vote
25 today, but . . .

1 MS. ATKINS: I would ask, as you think
2 about how to facilitate security clearances, you
3 keep it in context with what the purpose would be
4 for those clearances. For instance, the approach
5 may be very different -- and I'll use
6 simplistically -- pre-auction versus post-auction
7 or for a specific detailed issue that we're trying
8 to solve versus a general discussion. In some
9 cases it may be appropriate. In other cases, it
10 may not. And then in some cases, the vehicle by
11 which you do that might look differently.

12 So just keep that in mind as you peel
13 it back.

14 MEMBER SHARKEY: So that's the
15 recommendation on Question 1. Are there any
16 questions?

17 Question 2, "How can we most
18 effectively leverage existing or merging entities
19 to include CSMAC, PPSG, NASCTN and CAC to
20 streamline efforts and minimize the burden on
21 participating organizations?"

22 So the subcommittee recommended that
23 just -- NTIA would really play an important role
24 in trying to narrow our -- I mean, that's just a
25 partial list of the organizations. There's a much

1 longer list in the structure that you have put
2 forward -- I think just trying to make sure that
3 there are not overlaps in the work of those
4 organizations, because there's a very broad view
5 of everything going on. So to the extent that you
6 can play an organizing role of organizing those
7 agencies and making sure there's not duplicate
8 work would help reduce the burden and have a
9 greater efficiency to the work being done.

10 The second recommendation was that
11 FCC-related groups should also be included as part
12 of the outreach, including the FCC Technology --
13 or Technological Advisory Committee. I think, you
14 know, there is, again, often a lot of overlap
15 between work what's being done in the TAC and work
16 of interest being done in NTIA and making sure
17 that there's good communication between those two
18 and between the FCC and the FCC advisory committee
19 as part of that; that would be helpful.

20 And then the last recommendation for
21 this section really goes -- is related to the
22 security clearance issue, in that NTIA should
23 continue to consider an appropriate structure to
24 facilitate an exchange of detailed information
25 between the private sector and federal agencies,

1 particularly with respect to systems and issues
2 that include classified information.

3 So, again, kind of one of the
4 challenges that we have always faced is how to get
5 the -- the experts in the room from both sides to
6 really understand the issue and to be able to help
7 identify paths forward that would be useful to the
8 policy makers and regulators.

9 It's apparent from previous discussions
10 -- and this was very clear for AWS-3 -- that when
11 we started those discussions, neither side
12 understood how each other's systems worked. So we
13 spent a lot of time kind of educating each other,
14 and that had a huge impact on the analysis -- the
15 approach and the analysis and potential solutions
16 that are available.

17 It's challenging to do that in a large
18 room, you know, where we could end up with 100
19 people together looking at that, the vast majority
20 of which are not providing active input, right?
21 So you still end up with a small group that are
22 doing it, but it's still hard to exchange
23 information in that environment. And it gets very
24 difficult if there's classified information
25 involved.

1 And so, again, kind of finding the
2 structure on how to help facilitate classified
3 information, but -- but even how to facilitate a
4 real dialogue -- There needs to be a
5 back-and-forth interactive dialogue between the
6 experts as something that still needs tackled.
7 And, really, we would like to see -- as part of
8 our continuing work for this group to try and find
9 some of that and take into account some of the
10 information in the past month or so.

11 Any questions?

12 CO-CHAIR ALDER: Why don't you finish
13 the whole paper, and then we'll have questions.

14 MEMBER SHARKEY: Question 3, "How would
15 you modify the draft framework to most
16 sufficiently and effectively achieve the desired
17 collaboration?"

18 So we were provided with NTIA's
19 framework for how to move this effort forward, and
20 that's attached as part of the report. In
21 general, the subcommittee felt that the framework
22 was well conceived and would be a good guide to
23 collab- -- have collaborative efforts, and that
24 that should serve as the commonology for moving
25 forward more broadly.

1 A few areas that we identified were the
2 size of small working groups should be optimized.
3 The framework has some provisions for having
4 discussions between entities, but I think, again,
5 kind of making sure that those are kind of small
6 working groups that could really dig into the
7 issues will be important.

8 We found that the NDA, nondisclosure
9 agreements, are sufficient for full collaborative
10 efforts. We did -- You know, we used this as
11 part of our AWS-3 efforts, and it provided some
12 protection and allowed some greater information
13 flow, but, again, there would be classified
14 information, so it wasn't enough. And so you
15 need -- you know, need to make sure that there's a
16 process for getting industry clearances to
17 facilitate the dialogue.

18 Stakeholder input is critical for
19 technical studies. NTIA should ensure there is a
20 process for sufficient input on technical studies
21 from both industry and government. So at the
22 beginning of sort of the process of looking at
23 these bands, there's often analysis done by the --
24 by either NTIA or the government agency using
25 certain assumptions and coming to some conclusions

1 about potentials for sharing.

2 If those studies are based on incorrect
3 assumptions about the way the industry systems
4 work, the commercial systems work or other systems
5 work, they're often off by a pretty significant
6 factor. So I -- You know, the feeling is if we
7 can get some of that dialogue going beforehand so
8 that the analysis is as conformed and accurate as
9 possible before conclusions are drawn, that would
10 help and ultimately speed up the process, even if
11 it takes a little bit longer on the front end.

12 Again, a process for prioritizing
13 spectrum issues is required. So NTIA, FCC, DOD
14 and industry looking at -- And this is, you know,
15 identified to some extent in that framework
16 document, but -- and as part of that collaborative
17 effort, but looking at how to focus, you know,
18 what's important to each of those entities,
19 whether it's a federal agency or industry groups
20 on what are the top priority bands that should be
21 studied to really give you those in priority order
22 and making sure that's part of the effort.

23 And then, again, including the FCC
24 participation in the collaboration process. The
25 FCC, I think, you know -- I mean, they're --

1 Obviously, we deal with them a lot on the industry
2 side, and they are very involved and knowledgeable
3 about industry priorities. And I think making
4 sure that they're part of the front end of any
5 discussions would be helpful in making sure the
6 correct priorities are there, the correct bands
7 are there and that the analysis is fully
8 accessible as possible.

9 So that's the extent of the
10 recommendations.

11 CO-CHAIR ALDER: Thanks, Steve. Thanks
12 for the subcommittee on good work there. For
13 questions, let's use our old trick of going ahead
14 and raising your card and we'll take some
15 questions.

16 Janice . . .

17 MEMBER OBUCHOWSKI: I'm not sure it's a
18 question. It's an observation. I support the
19 work -- I certainly support much of the work of
20 the group and will support the recommendations.
21 It's a rather asymmetric set of recommendations,
22 because, for whatever reason, the FCC's customers
23 have never been subjected to some of the same
24 analysis.

25 And certainly when you look, for

1 example, at the difference between intensity of
2 use in urban or broader population areas and very
3 remote areas, there is an obvious difference, but
4 it's never really been quantified, nor has it been
5 a factor, and I think it probably would be
6 somewhat impactful in a bidirectional mode. So
7 there's an overlap with the work of my committee.

8 And while I don't even expect this to
9 happen, nor do I think it probably should be done
10 by the government, it would be very interesting at
11 some point to put sort of a Nielsen set of readers
12 on 1,000 customers and see what this broadband
13 drive is being driven by. When we hear the
14 rhetoric, it's always about health care,
15 education, the Internet of things, but I suspect,
16 again, it drives business, but it's probably not
17 quite as societally beneficial as some of the
18 rhetoric would indicate.

19 So that's a rhetorical point, but it's
20 also a substantive one that I feel rather deeply
21 about. Society really has to think about that,
22 and we don't have to say just because it's needed
23 because the demands are growing that the content
24 that's going over those broadband lines are worthy
25 of necessarily displacing other uses.

1 Thanks.

2 MEMBER SHARKEY: Can I respond to that,
3 Janice?

4 MEMBER OBUCHOWSKI: Sure.

5 MEMBER SHARKEY: Yeah, I think it's a
6 fair point, although -- And, you know, obviously
7 we're -- we look at -- From industry, we are
8 looking at these things from an industry
9 perspective, but we were also thinking about a
10 government perspective as well. And I think, you
11 know, the recommendation on a process for
12 prioritizing spectrum issues, that also goes to
13 including DOD and their priority issues. They've
14 put out some pretty aggressive visionary views of
15 how to enhance sharing from their perspective, and
16 I think those can be taken into account.

17 If they've got requirements they don't
18 think are being satisfied, you know, that should
19 be part of the process, right? That should be
20 part of what's being looked at and potentially
21 teed up for study. But I think the basis of all
22 of this and the recommendations of making sure
23 there's a better understanding of each side's
24 needs and requirements and how that interference
25 analysis is done and the impact of the

1 interference on both systems plays both ways and
2 would be useful from both perspectives.

3 MEMBER OBUCHOWSKI: And I agree. And I
4 think a lot of good work has been done, so thank
5 you for that.

6 CO-CHAIR ALDER: All right. Let's turn
7 to Mike.

8 MEMBER CHARTIER: Thanks. On
9 the terrain and clutter models, to the extent we
10 come up with better or interrelated models, we
11 would want to promulgate those through the ITU
12 study, Group 3, because that's dealing with the
13 rest of what the world uses when it comes to
14 propagation models. And if we want to harmonize
15 some bands or benefit from the harmonization, that
16 would be important to have those there.

17 CO-CHAIR ALDER: Other questions?
18 Paige, do you have some comments? Oh, Michael.

19 MEMBER CALABRESE: Yes, just one quick
20 thing. I don't know if this was necessarily
21 relevant to -- Steve, to your -- to your efforts,
22 but I noticed the NTIA's draft collaboration plan
23 seems to anticipate also public notice and public
24 participation; you know, not only industry, per
25 se. So I hope that we can keep that in mind. You

1 know, I don't know -- It's not easy to get an
2 informed public to participate, but there should
3 always be an opportunity for that, as there was
4 even in our AWS-3 working group through the CSMAC.

5 CO-CHAIR ALDER: Paige -- Oh, sorry.
6 Giulia, go ahead.

7 MEMBER G. MCHENRY: So this is just
8 sort of a comment. I notice -- With this model
9 interference impacts, I think this is one place
10 where, going forward, it might be interesting to
11 consider some of the risk analysis assessment work
12 that Pierre is doing to sort of consider
13 whether -- what is -- when we're thinking about
14 that modeling, what is the right approach to
15 creating the framework for that type of
16 assessment.

17 CO-CHAIR ALDER: Paige, it's to you.

18 MS. ATKINS: Thank you very much for
19 the work. I think it's summarized very well in
20 this executive summary report. I would say that
21 some of the bullets are more comments or
22 observations than specific recommendations, so
23 just keep that in mind as we move forward and
24 crisp up the dialogue.

25 I would say in Question 1, though I

1 agree work needs to be done, for instance, in
2 clutter and terrain impact, et cetera, to me it's
3 all about being able to come up with accepted
4 methods and tools, and that the focus of those
5 methods and tools may change over time, and
6 assumptions -- what we agreed to in assumptions.

7 I would also say that as we identify
8 specific bands that have been discussed in these
9 multiple recommendations, we do need to ensure we
10 maintain balance, as you just spoke to, Steve, to
11 include things like looking at federal and
12 non-federal bands. And TAC has done some of that
13 as well, so that might be an area of partnership
14 in the future. As Giulia mentioned as well,
15 looking at these methods and tools, that might be
16 an area that we can garner partnership and synergy
17 between CSMAC and TAC. And Pierre is going to
18 talk a little bit about some of his work later
19 today.

20 For Question No. 2, I think -- Well,
21 one, to go back to Michael's comment, we do want
22 some public engagement and dialogue. And it
23 depends on what the issue is, obviously, but we do
24 envision this as a multi-tiered activity that
25 spans the gamut that we've discussed. So I think

1 that's important.

2 In terms of general issues with -- with
3 clearances and access to sensitive or classified
4 information, as well as how we treat that in our
5 tools, databases, et cetera, I think that's an
6 area that we will need to continue to peel back
7 and determine what makes sense. I can't emphasize
8 enough you have to keep the context in mind and
9 the purpose, and then via that purpose, then, what
10 does it look like. And do you really need to also
11 exchange classified information, because it may
12 not always be necessary.

13 For -- I'll go to -- Let's see.
14 Question 3, in general, again, most of these are
15 comments or observations. Although they feed
16 this, what I think the recommendation is, is to
17 move forward with this layered framework and then
18 keep these things in mind as you develop it and
19 refine it. I think we need to keep in mind that
20 it's not just DOD in terms of the agencies. We
21 have to keep in mind the broad federal agency
22 requirements and concerns, and they will all be
23 engaged in this process through the PPSG, IRAC and
24 other mechanisms.

25 And for 2A dialogue, going back again

1 to the balance, part of what we want to keep in
2 mind is some of this is to help us understand not
3 only where industry sees value perhaps in specific
4 spectrum bands, but also what they see as
5 projections demand. We've gotten a lot of data
6 from Cisco and other entities, but continuing to
7 understand what that looks like, refine it,
8 understand architectural approaches, technology
9 approaches, so we can take that into account on
10 both the industry side as well as the government
11 side.

12 And I think I'll stop there.

13 CO-CHAIR ALDER: Do you want to
14 respond, Steve, or Tom?

15 MEMBER SHARKEY: No. I think that was
16 probably all the points.

17 CO-CHAIR ALDER: Unless there's any
18 other questions or suggestions for modifications,
19 is there a motion to approve this subcommittee
20 report?

21 MEMBER TRAMONT: So moved.

22 CO-CHAIR ALDER: We have a motion. Is
23 there a second?

24 MEMBER PEPPER: Second.

25 CO-CHAIR ALDER: All in favor say aye.

1 (Chorus of ayes).

2 CO-CHAIR ALDER: Any abstentions?

3 So with that, the report is adopted.

4 Thank you. Oh, I guess I should ask on the phone,
5 is there anyone on the phone who's either -- who's
6 objecting?

7 Not hearing any, again, it passes.

8 CO-CHAIR GIBSON: Also, for those on
9 the phone, please mute if you're not talking.

10 MEMBER SHARKEY: So do you want to talk
11 now about some of the future work and --

12 CO-CHAIR ALDER: Yeah. Why don't we
13 spend just a couple minutes on that, since we're
14 on the topic and everyone's mind is here. I think
15 it was pretty clear that you've got future work
16 around your information sharing and small working
17 groups, but go ahead.

18 MEMBER SHARKEY: Yeah. So -- Exactly.
19 I think we've talked somewhat about it, I mean,
20 the need for the small groups to really focus in
21 on problems. I think, you know, we did have some
22 good discussion and information that kind of
23 generated towards the end of our process here.

24 A couple of challenges -- There is --
25 You know, one of the challenges that we talked

1 about is in cases where there's classified
2 information, but even in cases where there's not
3 classified information, I think just the need to
4 get those small groups together and really talk
5 would work. So, you know -- And in many cases,
6 like you said, Paige, it may not be necessary to
7 exchange classified information, although that is
8 certainly an issue in some cases.

9 And to that extent, we are -- I mean,
10 our challenge has been, as we've looked at this,
11 is making sure that -- that a smaller group
12 doesn't run afoul of the requirements. And I
13 think we've started to look down some possible
14 avenues that, you know, might meet those
15 requirements.

16 Bryan provided some information on a
17 number of other FACA, groups. You know, the State
18 Department, the Commerce Group, the Department of
19 Homeland Security group that does deal with
20 classified information and, in those cases, going
21 to closed door sessions and is able to do more --
22 a little more closed environment in meeting FACA
23 requirements.

24 We also had a discussion with the
25 National Spectrum Consortium, which is really put

1 out to foster collaboration between government and
2 industry, looking at developing technologies for
3 sharing -- representative sharing. I think, you
4 know, the focus there is probably more on
5 implementation of technology, but, you know, I
6 think we had some good discussion with them about
7 potential ways that that model could be used to
8 help create smaller groups where they use a -- you
9 know, a contract agreement to -- So a project is
10 done under a contract agreement and then the
11 groups are formed to meet that -- satisfy that
12 contract agreement.

13 I mean, that may not be exactly what
14 we -- what would be right for our effort, but I
15 think there are a couple of areas that we felt
16 were useful to explore further and, you know, may
17 lead to some other areas that might be useful for
18 this body.

19 CO-CHAIR ALDER: Does anyone want to
20 have discussion on the next topic? You know, is
21 that something, Paige, you want to discuss here?
22 I mean, from my take, it sounds like the group has
23 interest there. Maybe it's something we should
24 consider.

25 MS. ATKINS: So what we're going to do

1 is, after this session, Mark, Larry and I will get
2 together and start peeling back the next steps.
3 So we'll take into consideration these topics.
4 That sounds like a relevant topic in particular to
5 help us focus and prioritize, particularly as we
6 lead to, I'll say, June 2016, where the membership
7 will go through a period of change.

8 So that's kind of the target. What can
9 we tackle and tee up and come up with good
10 recommendations throughout that period. So I
11 think it's a viable next topic, and we will
12 discuss that. And then, obviously, Larry and Mark
13 will coordinate the committee. And we're going to
14 try to have that initial discussion within the
15 next month.

16 One thing I do want to highlight, just
17 for those that may not participate in federal
18 advisory committees too much, particularly for
19 folks that may be listening in or here in person,
20 I just wanted to remind folks that these
21 recommendations are coming to NTIA for
22 consideration. So the recommendations adopted in
23 these -- these forms are not guaranteed that they
24 will go forward, that they will be considered and
25 that NTIA will respond to these recommendations

1 with how we have accepted or not and how we're
2 going to move forward. That will -- So I just
3 wanted to remind folks of that particular point.

4 Thank you.

5 CO-CHAIR ALDER: All right. Thank you.
6 I guess that's -- Unless there's any further
7 discussion, we'll move on to the next
8 subcommittee, which is the general occupancy
9 measurements, which Mark McHenry has been driving.
10 I know we didn't get the presentation into the
11 packets, so we're going to have the discussion
12 without that presentation here.

13 MEMBER M. MCHENRY: So this
14 subcommittee is looking at spectrum occupancy
15 measurements to help quantify the public use and
16 help inform the spectrum sharing process. And
17 Steve said two or three times in his talk that
18 both sides couldn't figure out how the other
19 systems worked. So that, to me, is the real value
20 of these measurements; it's to provide clarity and
21 technical depth on how the measurements would
22 work.

23 So at the last meeting, we presented
24 recommendations, and kind of the feedback from you
25 and others was kind of unclear. You wanted more

1 motivating detail, why were we making these
2 recommendations and what can we get out of it. So
3 we went back, and then Mark Gibson sent me -- or
4 the whole group, he made -- Mark took our slides
5 and said, "What about this? What about this?"
6 And he gave a list of, like, 50 questions.

7 So I went through --

8 CO-CHAIR ALDER: Mark, I think they're
9 having trouble hearing you on that end. Is your
10 mic on?

11 MEMBER M. MCHENRY: It's on.

12 CO-CHAIR ALDER: Maybe pull it closer.

13 MEMBER M. MCHENRY: So we took Mark's
14 maybe 20 questions -- it was not too many -- and I
15 wrote a five- or six-page summary and we put it
16 out to the subcommittee. I haven't got any
17 feedback yet, but I think the subcommittee is
18 agreeing. So the status -- Well, no one's saying
19 no. So I think the status is that next time we'll
20 finish this report off and send it in to the main
21 group.

22 So the main recommendations were to
23 make the measurements -- Partly because these
24 systems are so complicated, it's hard to build
25 analytic models or spectrum sharing. And if you

1 have measurements, it really tests your assumption
2 on how these will work and it fills a missing
3 parameter. So the legacy users always say, of
4 course, we fly at 50,000 feet all the time with a
5 2-watt transfer, and they make a lot of
6 assumptions, in which case these measurements
7 would drive that out.

8 So the document goes through kind of
9 the shortfalls and the analytical approach. It
10 shows how measurements get filled in and -- So
11 next time we'll -- Hopefully in the next few
12 weeks, we'll finish this document and put out an
13 e-mail to the whole group.

14 CO-CHAIR GIBSON: Let me make a quick
15 comment. If I recall from the meeting we had
16 before, the -- the report itself contained pretty
17 useful recommendations, but what it was missing
18 was the motivation behind those recommendations.

19 So the questions that I put together
20 for you guys were to flesh out what were the
21 motivations behind those recommendations so that
22 you would have a report with what drove it.

23 MEMBER MCHENRY: Yeah. And I did give
24 some examples. And the reason to do that is
25 because you can see what you gain by doing the

1 examples.

2 CO-CHAIR GIBSON: So do you think that
3 you'll have something that we can review with --
4 in toto by the next meeting, or what do you think?

5 MEMBER MCHENRY: Well, I think it's
6 100 percent done now.

7 CO-CHAIR GIBSON: Okay. I thought it
8 was before, yeah.

9 CO-CHAIR ALDER: So any other questions
10 for Mark or the measurements subcommittee?

11 Janice . . .

12 MEMBER OBUCHOWSKI: Well, this could
13 be -- This could be a question, but it's
14 certainly an observation. There's a lot of good
15 content here, both as to NTIA and FCC. I think
16 some of this should be applied, but the funding
17 for it -- I know that's a topic in another -- in
18 another one of our working groups, but the funding
19 for it is -- is basically non-existent as far as I
20 can tell.

21 I mean, this is pretty complex, and it
22 would be very useful to do it and -- You know, we
23 are basically dealing in a world of an underfunded
24 agency. So that's an observation, but I guess
25 it's also a question. Will we be recommending

1 that both FCC and NTIA seek, you know, budgetary
2 support for better occupancy testing?

3 MEMBER M. MCHENRY: There's also the
4 issue of who would do it. Would contractors do
5 it? Would the government do it? Would DOD
6 measure it themselves? So we added a paragraph or
7 two on -- We traded A for B with questions like
8 that.

9 I don't think the measurements are that
10 expensive, though. I mean it's 2, 3, maybe 10
11 people per year. It's not a huge investment.

12 MEMBER OBUCHOWSKI: Well, two or three
13 people of your caliber get pretty pricey.

14 CO-CHAIR ALDER: Thanks, Janice.

15 Richard . . .

16 CO-CHAIR GIBSON: Dennis had his up
17 first.

18 CO-CHAIR ALDER: Dennis, go ahead.

19 MEMBER ROBERSON: First, this is an
20 area that, as many of you know, is very near and
21 dear to my heart because of people like Andy
22 Clegg, who is sitting behind you there, of the
23 National Science Foundation, who funded our
24 efforts in this domain for the last decade.

25 And the price really is coming down and

1 the capabilities are coming up. We've just --
2 This is an exciting time, and I can't resist
3 putting this out there. We've just -- just
4 established the International Spectrum Observation
5 Center at the Illinois Institute of Technology, so
6 those of you -- It's really a beautiful name, but
7 for those of you that would be interested in
8 seeing sort of a prototype of what this might look
9 like, I'd be happy to show that.

10 It's, you know, six very large screens
11 with the ability to see various views of -- of the
12 spectrum that come from different geographical
13 locations, like my colleagues at Virginia Tech are
14 one of the contributors to this now, as well as
15 international locations.

16 But what we found in this is that --
17 that price really is driving down. It's not as it
18 was -- 10 years ago it was a very expensive
19 proposition to do anything that was meaningful,
20 but now we're moving to the place where you can
21 buy some pretty decent spectrum analyzers for, you
22 know, a couple thousand dollars and buy antennas
23 to drive them that are hundreds of dollars.

24 And with that kind of capability,
25 the -- still driving down, the opportunity to do

1 the kinds of things that are in the report have
2 become much, much more realistic, whether they're
3 done through universities or whether they're done
4 in collaboration with -- with organizations like
5 ITS and NTIA.

6 So that's -- that's a detail of
7 implementation, but the ability to do this is
8 something that is now upon us where it wasn't a
9 decade ago.

10 CO-CHAIR ALDER: All right. Thanks,
11 Dennis.

12 Rick Reaser . . .

13 MEMBER REASER: Rick Reaser, Raytheon.
14 We were briefed on an initiative, I think by the
15 FCC and others in industry -- Notre Dame was
16 involved with this one, and there was some
17 conference that one of the Raytheon people went
18 to, but as the FCC downsizes in its enforcement
19 bureau, they're talking about setting up these
20 remote viewing spectrum analyzers around the
21 country for monitoring enforcement.

22 Like -- As Dennis talked about, the
23 cost of these things is going way down. Brody &
24 Schwartz has apparently put together some plans
25 for this and we got briefed on them, but the idea

1 is -- You know, sort of like they've been putting
2 up video cameras everywhere, there's talk about
3 spectrum analyzers in major cities and all of that
4 to help monitor enforcement as the FCC's, you
5 know, manpower starts to dwindle and they're going
6 to remote all these things.

7 So there's a lot of discussion that --
8 And that might be something also worth
9 investigating, because it may not just be this
10 facility, NTIA and the ITS people, that would be
11 doing it. They'd certainly do some very detailed
12 special measurements, but there's talk about
13 putting spectrum analyzers, you know, all over the
14 place in this country and then netting them all
15 together to get a real picture. And maybe that's
16 what Dennis was talking about.

17 But Notre Dame was certainly mentioning
18 that in their group, and the FCC, I believe,
19 participated in that.

20 CO-CHAIR ALDER: All right. Mark
21 Gibson . . .

22 CO-CHAIR GIBSON: Yeah. I just wanted
23 to make another comment on the issue of funding.
24 Janice makes an excellent point, but my opinion is
25 that although funding is a challenge, it shouldn't

1 be a block. ITS was able to get some millions of
2 dollars to do occupancy measurements -- with
3 respect to occupancy measurements, and they -- I
4 mean, we are in the midst of trying to develop a
5 capability of sensing radars to support deployment
6 in 3.5 gigaband, so you'd maybe have some uptake
7 from that.

8 The -- Also, the cost of doing these
9 measurements is not prohibitive. I don't think
10 you're going to send a guy like Mark to do
11 measurements. You don't have to. He'd be
12 overqualified. He might want to, and I would,
13 too, but I don't think -- I mean, there's other
14 people that are more qualified that can -- Not
15 more qualified. All right. I've done myself in.
16 There's other people who can do it that -- that
17 aren't the caliber of a guy like Mark or others
18 like Mark.

19 So, in other words, you just don't need
20 to bang the hammer with a sledgehammer -- bang the
21 nail with a sledgehammer. I'm at this all day
22 long. I haven't had lunch either, so my blood
23 sugar is dropping. It's not pretty.

24 What I'm trying to get at, though, is
25 there are methods that are in place now that are

1 not expensive. There are people in place --
2 and -- So there are methods that drive the
3 capability, and that's not somebody that's high
4 caliber. And we've done measurements like this
5 before that -- across many paradigms, so cost
6 shouldn't be the limiting factor -- the
7 controlling factor. It may be a fact that we have
8 to deal with, but we should be able to get past
9 that.

10 CO-CHAIR ALDER: All right. Thanks.
11 Mark.

12 Rick, I think we already got you,
13 right? Or did you have another comment? Your
14 tent is still up.

15 Okay. With that, I think we'll look
16 forward to the report coming.

17 MR. KOLODZY: I had it up, but we're
18 moving on.

19 CO-CHAIR ALDER: And I think Paige
20 would like to make a couple of comments before we
21 move on.

22 MS. ATKINS: So I just wanted to
23 highlight that as we finalize these
24 recommendations, keep in mind we still have to
25 ensure that we use the information in the right

1 way, particularly in dealing with passive systems
2 or future requirements and we have a methodology
3 for leveraging the measurements, but also coupling
4 it with other information, depending on what we
5 plan to do with it.

6 I would also highlight -- And a lot of
7 discussion took place in terms of current
8 capabilities, costs going down, various efforts
9 that are occurring. We should look across the
10 board in terms of what assets are out there,
11 government and non-government assets, that could
12 be leveraged, as ITS has been doing with 3.5, in
13 terms of how do you centrally collect the
14 information and gain access for -- I'll say
15 authorized users, depending on what the purpose
16 is.

17 So I think there's a lot of capability
18 out there, and that may be an area we want to peel
19 back and see, again, industry and government
20 capabilities that are there that could be
21 federated in some way. So that might be a topic
22 that we want to pursue as a follow-on.

23 Then the last thing I'll say -- Well,
24 one -- one of the original questions was around
25 how you might be able to better characterize

1 occupancy with or without measurements. And I
2 don't think we ever -- The feedback on the
3 without measurements --

4 MEMBER MCHENRY: I left that out.

5 MS. ATKINS: So that's just a data
6 point. It's not necessarily super critical at
7 this juncture.

8 And then the only other comment I'll
9 make, which I was going to save until the end, but
10 I think it's important, is that as we look at
11 federated capability that is doing a lot of
12 sensing and sharing a lot of information, you have
13 to keep in mind, not just with this, some of our
14 other discussions; in particular, privacy concerns
15 as well as cyber security concerns. So that might
16 be an area that we need to peel back as well.

17 Thank you.

18 CO-CHAIR ALDER: Okay. Thanks, Mark.
19 And we'll look forward to that report next time.
20 As you said, it's largely complete.

21 So let's move forward to enforcement,
22 then. Dale is going to summarize the enforcement
23 report.

24 MEMBER HATFIELD: Yes. Thank you. And
25 I believe Mark Crosby is on the line, so I'd like

1 Mark to help me out as sort of a coach here of the
2 enforcement subcommittee.

3 MEMBER CROSBY: I'm here.

4 MEMBER HATFIELD: We were asked to
5 answer five different questions. Let me just
6 really quickly read the five just to refresh your
7 memory. Question 1 is, "In a shared spectrum
8 environment involving both federal and non-federal
9 users, what types of sharing criteria would need
10 to be specified in the FCC's ex ante regulations,
11 and what can be subject to post-rulemaking
12 /post-auction negotiated coordination agreements
13 or other sharing arrangements?"

14 The second question is, "How would
15 negotiated coordination agreements or other
16 sharing arrangements be enforced and by whom?"

17 The third, "In a Shared spectrum
18 environment where many consumers have widespread
19 access, what additional tools do the FCC and NTIA
20 need to ensure compliance with sharing criteria or
21 or arrangements?"

22 Four, "How can service providers" --
23 "How can service providers, federal users and
24 regulators quickly identify and stop harmful
25 interference as quickly as possible?" There's a

1 little redundancy there.

2 Question 5, "How should NTIA and the
3 FCC identify and rectify harmful interference
4 resulting from an aggregate of operations from
5 multiple co-channel or out-of-band emitters?"

6 We broke our work into
7 sub-subcommittees, if you will, and the principal
8 authors for the answers to Question 1 were Mark
9 Crosby and Audrey Allison. Question 2 was David
10 Donovan and Jennifer Warren, who I believe are
11 both on the phone. Question 3 was Mariam Sorond.
12 Question 4, down to my right, Tom Dombrowsky,
13 with a little help from me, I hope. And then
14 Question 5 was myself with help from Dennis
15 Roberson.

16 We went through the questions in the
17 February meeting, if you'll recall, and one of the
18 comments we got is that it needed to be -- we
19 needed some executive summaries. And my good
20 friend and colleague to my right, Paul Kolodzy,
21 put together an executive summary. So what you
22 have in front of you right now is both the full
23 responses to the questions, which I say were
24 discussed at the earlier meeting, plus Paul's
25 summaries.

1 The subcommittee has reviewed on
2 several different occasions the material that --
3 that's in the complete responses and executive
4 summary and is also based on a meeting we had in
5 February. So I think we're ready to suggest that
6 it be adopted by the -- by the full committee, but
7 if you'll -- And if you have questions that are
8 detailed, I think what I'd like to do is turn
9 the -- let the individual authors respond to them
10 if we could. I won't just summarize them myself
11 since we've already gone through them.

12 But I would like to add a couple of
13 comments. Both reviewing again last night and
14 hearing Paige a moment or two ago commenting on
15 Steve, I wish our recommendations could have been
16 sharper. Having said that -- And I -- I don't
17 want to sound like I'm making excuses, but it
18 probably sounds like that anyway.

19 MEMBER ROBERSON: Remember that your
20 students are in the room.

21 MEMBER HATFIELD: But weighing against
22 this and trying to come up with sharper
23 recommendations is the fact that this is a
24 really -- When you talk about enforcement, it's
25 really, really a complicated environment. And, of

1 course -- Well, especially in a spectrum sharing
2 environment, enforcement becomes that much more
3 challenging.

4 But even perhaps more to the point, the
5 system we have -- students -- the system we have
6 here in the U.S. of the split jurisdiction between
7 federal government and non-federal government use
8 further -- further complicates. And I'll give an
9 example of that in a moment.

10 And just -- Enforcement is sort of an
11 interesting thing to use shared spectrum through,
12 because it forces you to kind of understand the
13 piece parts of the system, because how can you
14 hope to enforce it if you don't know how the whole
15 thing sort of plays together, a little bit about
16 where things can go wrong and where you would need
17 enforcement. So it's -- It -- There's so many
18 independencies and so forth, that it's really
19 difficult to get your arms around the complexity
20 enough to be able to provide really, really sharp
21 recommendations.

22 Let me make two more comments, and then
23 I'll stop. I have just some additional
24 observations or whatever and -- One is the
25 problem with the ex parte rules of the commission.

1 It's hard for -- I mean, this is -- By nature,
2 you're going to have to have enforcement
3 activities on the federal government side and
4 enforcement activities on the FCC side, but it's
5 harder for us to have conversations about any of
6 the current proceedings about enforcement because
7 we run into the -- we run into the ex parte
8 problem.

9 If you'll remember, the way I tried to
10 dodge it myself in the 5 -- in Question 5 is -- is
11 to propose a sort of generic straw person saying
12 "This doesn't look like anything out there. It's
13 sort of an amalgamation," so we could have
14 conversation without getting into the specifics of
15 particular proceeding.

16 I'm not sure -- I'm not sure how
17 to get around this problem, because you'd like
18 to have a full dialogue, but you run into the
19 ex parte things, which is something I believe in.
20 I'm not arguing they shouldn't be there, but it
21 does complicate things.

22 One solution that I think would be
23 helpful is perhaps if we could get ahead and look
24 at a couple of bands that were sort of -- that may
25 eventually come into play, commercial and

1 non-commercial, and begin to look at those so that
2 there's no on-going proceeding at the commission
3 and so we wouldn't run into the ex parte issue.

4 The other comment that I wanted to
5 make, and it's already been touched on, is the
6 FCC's enforcement modernization. While we were
7 thinking about enforcement here, there were sort
8 of seismic shifts, if you will, in how the FCC was
9 contemplating enforcement in the future. And as
10 you all know, they proposed a major realignment of
11 their spectrum enforcement activities. That's
12 already been -- been touched upon.

13 And so it's a little bit of a moving --
14 a little bit of a moving target here as to, well,
15 what capabilities will they have and where will
16 they be located, and then how does that inform our
17 decisions, even if we want to cooperate or
18 whatever, if we're in a little bit of a state of
19 flux.

20 All right. I would add one other
21 thing, too. I think sometimes there is a little
22 bit of confusing -- confusion about spectrum --
23 monitoring spectrum occupancy measurements and the
24 sort of measurements where you may need to take a
25 form of enforcement action.

1 Now, I am not a lawyer, but I think the
2 rules of evidence and that sort of thing begin to
3 kick in, because now you're going to actually try
4 to prosecute somebody. And, you know, what's
5 the -- Again, there are lawyers someplace around
6 me that could probably help here, but we've got to
7 be careful, I think. We want to share these
8 resources, but we've got to keep in mind, if
9 they're going to ultimately be used for
10 enforcement, then you may have some additional --
11 additional requirements that you might not
12 otherwise have.

13 So why don't I -- Why don't I stop
14 there. If there's any comments, of course, on any
15 of the individual questions, I'd be glad to farm
16 them out to -- to the our individual authors.

17 CO-CHAIR ALDER: Thanks, Dale.
18 Questions?

19 MEMBER CROSBY: This is Mark Crosby.
20 Can I make a statement?

21 CO-CHAIR GIBSON: Sure. Mark Crosby,
22 go ahead.

23 MEMBER CROSBY: I just wanted to say
24 Dale, that was excellent. Thanks very much for
25 covering for me. The -- There were just two

1 minor edits to the last go-round. There was --
2 The last time we circulated it to the full
3 subcommittee there was a minor modification or
4 suggestion from Harold that was added to Question
5 No. 2, and Mariam rewrote this summary to Question
6 No. 3.

7 That will -- Those were the only last
8 enhancements to these responses that the committee
9 actually had done a while ago. So, you know, I --
10 And I do -- One of the things that Dale -- The
11 NTIA leadership would like clarity and perhaps
12 some recommendations to those responses, and I
13 said we will, obviously, endeavor to do that to
14 the best of our ability, but I don't know whether
15 we'll be able to achieve success on this.

16 But speaking for myself, I think you
17 can certainly attempt to have the authors with
18 regard to their summaries hopefully make it
19 clearer. But I totally agree with Dale, and we'll
20 do the best we can.

21 CO-CHAIR ALDER: All right. Thanks,
22 Mark. Other questions in the room?

23 Janice . . .

24 MEMBER OBUCHOWSKI: I have a question,
25 I guess, for Paige, but -- but indirectly also for

1 the FCC. There's a -- what I would consider to be
2 an excellent recommendation on an MOU to get the
3 ball rolling. Is that in play or is that
4 something that has not yet been discussed between
5 the FCC and NTIA?

6 MS. ATKINS: I'll start, and then Julie
7 can chime in. We -- Julie Knapp. So there is
8 obviously an MOU that's in place between the FCC
9 and NTIA today not geared specifically to this
10 topic, but in terms of enforcement and I'll say
11 alignment in this regard.

12 It's something that definitely we can
13 discuss. I don't believe there's been any serious
14 discussion in this area, and it's one of the
15 recommendations that we really would take back and
16 discuss and determine what we could do with it.

17 MEMBER OBUCHOWSKI: Well, then, that
18 leads me kind of to an observation. That is, none
19 of the rest of what we're doing is going to be
20 worth the paper it's written on if we don't get
21 enforcements squared away. Sharing databases,
22 trust -- If people don't think that the agencies
23 are going to move effectively to protect equities
24 in either direction, why bother?

25 And I think there's been enormous

1 progress that has been made, but I actually think
2 the enforcement progress, which has been made --
3 I think this is an excellent report. I mean, it's
4 terrific work by the committee, but frankly
5 speaking, you know, looking at my government,
6 there's a lot of talk and very little action in
7 terms of putting some of this into place. So I
8 don't know when that train is going to leave the
9 station, but it's a critical one to start moving.

10 And one of the issues here that's kind
11 of teed up but not really addressed is -- and Dale
12 alluded to it in part -- is what do you do with
13 unlicensed -- particularly the unlicensed that are
14 less than sophisticated? That is going to be a
15 difficult enforcement issue, and it's going to be
16 tied to the future of the license, at least as far
17 as, you know, some people are concerned.

18 So those would be my two observations.
19 I think there's a lot of good work going on, but
20 in terms of enforcement, the government's lagging.

21 CO-CHAIR ALDER: Dale . . .

22 MEMBER HATFIELD: I just wanted to
23 mention the report that -- for Question 2 that
24 David Donovan and Jennifer Warren wrote. It
25 really opened my eyes, especially as a non- --

1 non-lawyer. I mean, we're almost -- what? --
2 getting into Constitutional issues here at some
3 level and trying to do things across that --
4 across that border.

5 Anyway, I would commend that -- commend
6 that report, because I think it -- it really tees
7 up kind of nicely some of the issues -- Now, here
8 again, I'm not a lawyer, but it seems like it tees
9 up pretty nicely some of the issues that are --
10 that are associated with enforcement with this
11 bifurcated jurisdiction we have.

12 CO-CHAIR ALDER: Thanks.

13 Richard . . .

14 MEMBER REASER: I was wondering, did --
15 I'll ask a question. Did the committee consider
16 how you would fund enforcement, like how you'd pay
17 for this? One of the issues that Janice brought
18 up over and over again is at some point, you have
19 to pay for this.

20 So the question would be, you know, how
21 does that happen, especially if you have this
22 complicated, you know, way we manage things here
23 with the -- with the two different agencies and so
24 forth?

25 But that would be something that would

1 need -- Because what's interesting about it is if
2 you take a look at what's happening, we're sort of
3 reducing the number of people out of the
4 enforcement bureau, at least on the FCC side. And
5 NTIA doesn't really have an enforcement function,
6 so we're sort of heading in the opposite direction
7 in funding and manpower and so forth.

8 So there seems be some kind of squeeze
9 on funding in some ways, or -- I think that the
10 way it was written, when I read about why they
11 were doing it was, well, we probably don't really
12 need that many enforcement things because of this,
13 that and the other thing, so -- But the issue of
14 funding, I think that's one of the other things
15 that needs to be addressed. And Janice has made
16 that clear in all the other recommendations.

17 CO-CHAIR ALDER: Let's -- Go ahead.

18 MEMBER HATFIELD: If I could add, too,
19 it seems it pushes us toward more automation to --
20 I think looking forward, we need to think more
21 about how to automate these functions so you can
22 do a lot of the enforcement activities without
23 having to roll trucks and send people out and make
24 manual measurements and that sort of thing.

25 CO-CHAIR GIBSON: Paul . . .

1 MEMBER KOLODZY: Just to follow up a
2 little about what Dale was just mentioning about
3 enforcement and automation and the like, we are
4 now, I think, in a threshold of a major change
5 that's going on in the technology sector that we
6 need to start thinking about in this organization.
7 I'm not trying to push us. I'm just trying to
8 make a comment here.

9 That is, things are happening too fast.
10 You're in the stage where you actually have
11 machinery, just like you were 100 years ago, where
12 the machines were operating faster than the human
13 beings. So the human beings could not control
14 them individually, and they had to do something
15 else to control it.

16 When you're talking about enforcement,
17 completing activities and being able to collect
18 information and process it and discern things,
19 feedback mechanisms to different users and the
20 like, all of that is done in a privatized way with
21 individual spectrum holders, but not within the
22 sense of the whole construct of the government
23 spectrum users, for example, or combining the
24 government spectrum users and the private spectrum
25 users or the commercial spectrum users.

1 We need to start thinking about those
2 kinds of technologies and trying to understand it,
3 because it's only going to go that direction.
4 It's happening too fast. You have to look at the
5 trends. And one of the things I think this
6 organization needs to look at is what are those
7 trends that are occurring technologically and in
8 business and how do we get ahead of it versus
9 turning ourselves into a reactive, you know,
10 organization, which is trying to say, "Oh, this is
11 happening. Now what do we do about it?"

12 CO-CHAIR ALDER: Dennis . . .

13 MEMBER ROBERSON: One of the other
14 points that's made in the report that I think is
15 very relevant here -- and that raises the specter,
16 I will put forth, in the front end -- is that it
17 is at the regulatory's option. Following on what
18 Paul was just described, there -- The requirement
19 to keep track of what you're doing, rather than
20 having the government observe, having the people
21 who are using the spectrum make observations and
22 provide the information, even -- even in such a
23 way that it could be used in the sense that Dale
24 talked about from a court of law perspective.

25 But the technology is arriving in such

1 a way, and the benefits and the cost structures
2 and all the rest are -- are there, so that
3 imposing this kind of proof on those who would use
4 the spectrum seems to be one of the options that
5 we have.

6 CO-CHAIR ALDER: Paige, do you want to
7 make some comments on this?

8 MS. ATKINS: A couple. So as we move
9 toward this new spectrum world, which is I think
10 the phrase that Janice used in our last meeting,
11 and sharing in particular, we do have to be very
12 deliberate and smart about how we do it so we do
13 not cause chaos in the process. I think it's
14 the -- one of the most critical areas.

15 I commend the subcommittee for the work
16 that's been done and the executive summaries and
17 the -- the some of them that have been written. I
18 think they're actually quite good. Things could
19 be further clarified and crystallized. However, I
20 wouldn't hold up this document to try to continue
21 to do that. I think we have enough to where we
22 could move forward.

23 Our challenge, quite frankly, is taking
24 such a tremendously complex issue and decomposing
25 it for our own use and being able to understand

1 what we can do to include funding, when we can do
2 it and how to prioritize those efforts, as well as
3 the interdependencies among all of the elements
4 that are in this recommendation.

5 It's going to take us a while to assess
6 it and figure out how we move forward. One of the
7 low hanging fruits may be, you know, looking at
8 the MOU and working with the FCC to help align our
9 enforcement activities. But it will take us a
10 little bit to -- a little time to go through the
11 recommendations and figure out how to move
12 forward.

13 I would emphasize context is important,
14 like why are we taking measurements? Is it
15 monitoring for occupancy? Is it for enforcement?
16 And context is important to a lot of the topics
17 that we've been discussing. And in this case,
18 it's important to understand that it's not just
19 measuring and enforcing federal functions, but
20 it's potentially measuring and enforcing
21 non-federal functions. So it really is where
22 everything comes together.

23 So, again, thanks to all the
24 subcommittee folks that worked on this; great
25 work. It will just take a little bit of time for

1 us to peel it back. And we may have questions
2 along the process of determining how we move
3 forward on recommendations.

4 CO-CHAIR ALDER: Great. With that, I'd
5 be looking for a motion to adopt this report.

6 MEMBER ROBERSON: So moved.

7 CO-CHAIR ALDER: A second I see as
8 well.

9 All right. So everyone in favor of
10 adopting the report say aye.

11 (Chorus of ayes.)

12 CO-CHAIR ALDER: Any opposed? Any
13 abstentions?

14 With that, the report is adopted.
15 Congratulations to the subcommittee. Great work.

16 And then we'll keep moving forward, and
17 we'll hear from, I think, Michael on the spectrum
18 sharing cost recovery.

19 MEMBER CALABRESE: There is a
20 presentation in the folder, so I'll do the first
21 part of this and then Charla, who is co-chairing
22 this subcommittee, will come in on the back half.
23 And we're hoping to have some robust discussion,
24 because we certainly could use feedback and more
25 ideas, more expertise. This was definitely a

1 tough bear to wrestle.

2 The question we received is "How should
3 federal agencies be resourced to develop and
4 implement sharing with non-" -- basically in bands
5 that aren't -- that are not related to auctions --
6 so for "non-auction licensees or services, such as
7 unlicensed" use, potentially public safety or even
8 licensed by rule that doesn't involve an auction.

9 We have a list of the members of the
10 committee and the background. Again, I think
11 most -- most of the members know, but it's worth
12 repeating that the Commercial Spectrum Enhancement
13 Act authorizes a spectrum relocation fund, you
14 know, which has been in use for years, to
15 reimburse federal agencies for the costs related
16 to clearing and sharing bands that are reallocated
17 by auction.

18 But outside the context of an auction,
19 federal agencies have no source of reimbursement
20 for costs related to facilitating band sharing,
21 such as with unlicensed -- you know, by unlicensed
22 users, for example, or other improvements and
23 spectrum efficiency that would be unrelated to the
24 agency mission.

25 And so, you know, the problem is

1 incentives -- our old friend incentives that --
2 And agencies have nothing but disincentives to --
3 to share or to be more spectrum efficient if that
4 means cannibalizing their -- their own mission
5 budget and if there's no source of cost recovery.

6 And, specifically, there are several
7 statutory obstacles to agency cost recovery.

8 First, as I essentially have said, the CSEA
9 generally limits reimbursements from the spectrum
10 relocation fund to relocation or sharing costs
11 related to bands that are auctioned. So no
12 auction, no reimbursement.

13 Then there's the Miscellaneous Receipts
14 Act that requires any agency, quote, receiving
15 money shall deposit that money with the Treasury,
16 although there are some established exceptions for
17 payments not, quote, received by the government,
18 which we need to look into further.

19 And then third, there's the
20 Anti-Deficiency Act, which prohibits federal
21 employees from accepting, quote, voluntary
22 services not authorized by law, although there
23 are, again, certain exceptions for gratuitous
24 services that the GAO has recognized on occasion
25 and which we also need to look into a bit further.

1 So we had, as part of this process, a
2 series of informational meetings with, we hope,
3 you know, most of the right folks who have been
4 thinking about this from various perspectives; the
5 OMB, the commerce division there; with the defense
6 spectrum organization; part of the DOD of course;
7 with NTIA's Office of Spectrum Management and with
8 the FCC, primarily the wireless bureau, since, you
9 know, with the auction coming up with AWS-3, they
10 had done a lot of thinking about this, and also
11 the 3.5 gigahertz band.

12 We also spoke with Tom Power, the
13 former deputy CTO in the Whitehouse Office of
14 Science & Technology Policy, and Dorothy Robyn,
15 who was the former head of the Public Building
16 Services Division at GSA and former undersecretary
17 of defense for Installations and Environment.
18 She's engineered a number of real estate swaps,
19 which -- which fit within federal guidelines, for
20 example. So we thought there may be some
21 analogies there.

22 So we really have -- We were told to,
23 you know, kind of try to exhaust non-legislative
24 approaches first, and what we've come up with are
25 kind of a symmetrical set of recommendations and

1 options for further study under both banners. So
2 first we have one recommendation and some
3 additional options under non-legislative
4 approaches, and then we have a recommendation and
5 some additional options for further study under
6 legislative approaches.

7 And we're not asking for a vote today
8 on anything. This is really the first cut, a
9 chance for you all to give us feedback, and then
10 we hope that for the August meeting, we can have a
11 more finely -- more refined set of -- of
12 recommendations and hopefully have either adopted
13 or dismissed other options.

14 So first we have the non-legislative
15 approaches, and we had a consensus that we could
16 make one recommendation which has two parts. That
17 is, that NTIA should seek OMB clarification for
18 dissemination to other federal agencies. First,
19 that cost recovery related to hybrid bands is CSEA
20 eligible. So these are bands -- And what we mean
21 by "hybrid bands" would be bands that assign
22 private sector access for both auction and
23 non-auctioned use, such as bands that are
24 reallocated under the three-tier access model that
25 was recommended, which includes licensed and

1 unlicensed access.

2 The 3.5 gigahertz band may be an
3 example of that, but since there's no -- no
4 suggestion so far that the DOD is seeking cost
5 recovery, it may be useful in the future to
6 clarify that such a band would be completely
7 eligible under CSEA.

8 And second, OMB clarification that cost
9 recovery related to additional sorts of indirect
10 impacts on non-auctioned frequencies. What -- I
11 believe it was Peterston who referred to it as
12 domino bands with a nexus to an auction would be
13 CSEA eligible. And so an example for -- An
14 example that's already been authorized, for
15 example, is NOAA cost recovery for the relocation
16 of radiosondes from the band just below the
17 auction band, 1695 to 1710, because it was part
18 reconfiguration of NOAA's operations that allowed
19 1695 to 1710 to be auctioned. And those
20 radiosondes, even though they're located outside
21 the auction band, it's part of the domino effect
22 that -- and these costs allow greater -- both
23 greater clearing and sharing.

24 And so we thought, you know, there
25 would be other -- There's certainly other

1 scenarios that make this worth clarifying. One
2 would be the potential consol- -- What about the
3 situation where you have a consolidation of
4 multiple agency bands where perhaps one ends up
5 being auctioned either for exclusive use or as
6 part of a hybrid band approach, but another band
7 is only -- the FCC decides it should be opened
8 only for non-auctioned use, such as unlicensed
9 or -- or some other non-auctioned use?

10 So that could be an example where there
11 could be costs that would stretch across all of
12 those different bands of one agency in order to
13 kind of restructure their use of spectrum with a
14 lot of good residual effects, but not all of the
15 bands -- not all of the -- coming out of that not
16 all of the bands would be auctioned at all. Then
17 we have -- So that's the -- our preliminary
18 recommendation.

19 Then we have, under non-legislative
20 approaches, other options for further
21 consideration. The first is, again, along these
22 same lines, to seek and adopt guidance from OMB on
23 the degree to which agencies can benefit
24 indirectly from private sector expenditures. And
25 this could be perhaps from industry directly or

1 from fees that are pooled by a band manager
2 certified by the FCC, such as -- You know, an
3 example might be the spectrum access system
4 3.5 Gigahertz.

5 And these -- these indirect benefits
6 could include unfunded R&D, testing, sensing
7 systems or geolocation database development that
8 could promote sharing across multiple bands or in
9 a particular band and do so without violating the
10 Anti-Deficiency Act.

11 So there's some -- You know, we've
12 seen some examples of this already, but there's,
13 you know, a real spectrum -- pardon the word -- a
14 continuum of possibilities which are very unclear
15 even in all our discussions. So when we saw it
16 ready, of course, which the CSMAC was involved in,
17 industry and DOD partnered to evaluate the
18 feasibility of sharing 1755 to 1850 with DOD
19 providing personnel and access to military bases
20 and installations while, you know, the private
21 sector paid for engineering -- some engineering
22 costs. And that was considered okay.

23 Apparently the FCC is anticipating that
24 in the 3.5 gigahertz band, the passive sensing
25 network will allow the conversion of exclusion

1 zones to coordination zones, which would
2 apparently be paid for by the private sector
3 through the -- probably through the spectrum
4 access system with those costs being amortized and
5 recovered by fees charged by the spectrum access
6 system.

7 Again, that could have been -- That's
8 passive sensing that could have been deployed by
9 federal agencies. They basically benefit
10 everybody involved on both ends of the equation,
11 and so it creates kind of a murky line, which is
12 the answer we got from all of those -- the
13 alphabet soup of agencies we consulted.

14 And -- And as I said, there is a
15 continuum of private -- potential private sector
16 support for these activities. On the one end, you
17 know, there's things like R&D, testing and --
18 testing by private parties that can indirectly
19 benefit an agency's effort. This information
20 might be put in the public domain or filed with
21 the FCC, and there seems to be no problem there.

22 But it gets trickier -- For example,
23 what if an agency shares spectrum in exchange for
24 use of private sector networks or services? So
25 the private -- you know, the industry or whoever,

1 you know, actually establishes a network on the
2 shared band and the federal agency actually uses,
3 you know, that band -- or uses that network as
4 part of the effort to achieve greater
5 efficiencies. And then even more difficult would
6 be the transfer of actual funding or tangible
7 goods to an agency, such as, for example, paid for
8 by fees auctioned by an FCC authorized band
9 manager.

10 Finally, a second -- And this is just
11 the flip side of this coin probably, but there are
12 other tools that should be considered for this
13 purpose. And there could be more -- possibly more
14 buckets than this, but there are three that we
15 would like to look at further. One is cooperative
16 research and development agreements, CRADAs,
17 between a government agency and a private company
18 or university. Again, these seem to be pretty
19 much -- pretty well accepted.

20 Then there are also exceptions that
21 exist for no-cost contracts and for gratuitous
22 services. So how would that apply here and what
23 are the limits?

24 And then gifts in kind, which are
25 permitted for certain agencies; DOD by statute for

1 example. So, again, all this we've kind of
2 uncovered but haven't gotten fully to the
3 bottom -- to the bottom of it as far as any kind
4 of final recommendations.

5 Charla . . .

6 MEMBER RATH: Yeah, sure. A couple of
7 things. First, you know, Michael has talked about
8 all of the things that we've uncovered, ways that
9 we might be able to do something not
10 legislatively. First off, I want to say thank you
11 to everybody who was on the committee, because we
12 had a number of, you know, fairly detailed
13 meetings with -- in particular with people, you
14 know, from OMB, NTIA, Dorothy Robyn, which you
15 mentioned, but what you didn't mention is she's
16 actually written an awful lot on this subject
17 talking about ways -- different unique ways for
18 federal government and private sector to work
19 together that are, you know, sort of outside the
20 norm. And so we -- And that's one of the reasons
21 we went to her. It's not just her background, but
22 it's some of the things that she's written about.

23 And it's interesting because, you know,
24 Michael just spent a lot of time talking about all
25 the non-legislative ways we could do this, but in

1 fact, our conclusion was there's not an awful lot
2 that you can really do. And he's uncovered just
3 about every single thing we've thought of, and a
4 lot of it is very kluge. It's -- You know, we
5 might be able to do it. You could probably come
6 up with a circumstance where you get, you know --
7 you know, some private sector members together
8 with the government and they work out a deal that
9 allows access to spectrum. The question is, is
10 this actually the right way to go forward?

11 OMB -- You know, I don't want to put
12 words in their mouth, but -- And they've -- And
13 there's a letter that's asking these questions. I
14 don't know if everybody on the committee is aware,
15 but there was a letter sent by several members of
16 the senate on the 28th of April that actually
17 asked them, in a way, to do what we've been doing,
18 which is to say, you know, how far can you go with
19 using the spectrum relocation fund to -- to
20 provide some ability to agencies to do work in
21 advance of something. I was going to say in
22 advance of an auction, but it may not be in
23 advance of an auction.

24 So we will get more clarity from OMB on
25 this point, but I think there is a sense they've

1 gotten about as far as they can go in terms of
2 what can be taken from the spectrum relocation
3 fund to fund any kind of work.

4 That said, we -- we do think -- or we
5 have one recommendation on the legislative side,
6 and then we have another that we just want -- we
7 want to spend some time on and hopefully get some
8 feedback from all of you on recommendations as
9 well, but also on some of the options.

10 There's this sense -- I mean, if you
11 read CSEA, it's very tied to auctions. So even
12 though Congress put sharing in there, in the last
13 Congress in 2012, if you actually then go and read
14 the bill, that's fine, because sharing's in there,
15 but you have to have an auction. One of the
16 things that we -- that I would say the entire
17 committee agreed on is there are certain things
18 that agencies can and should be doing that are
19 tied to maybe even exploring whether there could
20 be an auction.

21 Right now, there actually has to be an
22 auction in place. So what we were recommending
23 and -- and hope that -- you know, and we'd like to
24 get some discussion, but hope there would be
25 agreement here, is that, in fact, there are some

1 fairly basic things that agencies can do. And it
2 could turn out that it doesn't lead to an auction.
3 It might lead to identifying, "Well, in fact, this
4 isn't a good band to auction." It might be better
5 to use for unlicensed. It may be a type of
6 sharing arrangement that, for some reason, you
7 know, wouldn't go to auction; that they be allowed
8 to do some of that work coming out of the -- the
9 spectrum relocation fund.

10 One of the issues we raised, though, is
11 that -- and there's also another letter that came
12 out just in time; there's all these letters that
13 are directly related to what we were doing,
14 that -- from the CBO that suggests there could
15 be -- there could be scoring issues associated
16 with any money that is already in the spectrum
17 relocation fund if it's used for purposes that
18 weren't anticipated in the 2012 Act.

19 So, you know, that's -- that's
20 unclosery. You know, I don't know whether that
21 would be everyone's interpretation, but that is
22 actually -- you know, that's out there as just for
23 money that is currently in the SRF. So in a way,
24 this is a recommendation that would look at that
25 piece, but it would also be a recommendation that,

1 going forward, that at any auction going forward,
2 the monies that are put into the SRF would be
3 allowed to be used for these sorts of purposes
4 outlined in your dec. You know, R&D, testing,
5 sensing, geolocation, database development, that
6 would advance federal government to federal
7 spectrum sharing and spectrum efficiency
8 generally.

9 So that's the recommendation to NTIA
10 that we'd like you-all to talk about at this
11 session and consider for a vote if -- you know,
12 depending on what people think for the next one.

13 And then in terms of just other
14 options, one of the things that we were talking
15 about a lot is -- and this came up -- or my
16 recollection is this came up in the very first
17 meeting I attended where there was a lot of
18 discussion about cost causers. You know, if --
19 Right now, quite frankly, it's -- You know,
20 there's several of us at the table who have paid
21 heavily into the spectrum relocation fund, and
22 there's some suggestion that, you know, if you're
23 a company that can actually take advantage of
24 spectrum, that is where agencies would be
25 relocated, you know, and that maybe there ought to

1 be a way for those companies to actually pay into
2 the fund as well.

3 Well, there's no mechanism for that
4 now. There's no -- One of the things we talked a
5 lot about -- and it doesn't really show here -- is
6 that if you actually set up -- even if you set up
7 a system like databases where you have fees and
8 the fees are meant to offset costs or like UTAM,
9 for those of you who have been around long enough,
10 know about how unlicensed PCS was cleared. And I
11 know there are some people who were very involved
12 in that.

13 The problem that we have is you don't
14 have a way to get that funding to the federal
15 Government. So one of the -- One of the options
16 for consideration is to look at, you know, what
17 changes to some of the laws that Michael was
18 talking about in the beginning could take place
19 for limited exceptions that would allow these kind
20 of fees to be paid into the SRF, and then also for
21 the SRF to be used to pay for relocation of --
22 of -- you know, of agencies that may be in
23 spectrum that are currently -- you know, that
24 might be better used for unlicense or sharing or
25 satellite or, you know, for any number of things

1 where it wouldn't be an auction.

2 So I think that's -- that's probably it
3 for -- It's a lot we put on the table. And one
4 of the things we really wanted to encourage in the
5 time -- I don't know, Larry, how much time we
6 have -- but just to encourage, you know, feedback.
7 And then if you have a chance to look at it after
8 the meeting, you know, giving us any written
9 feedback would be really appreciated.

10 MEMBER CALABRESE: The last point, I
11 would just say that you might think of that as a
12 revolving fund kind of concept where the agency's
13 up-front costs could be covered through the
14 spectrum relocation fund with fees or -- you know,
15 whether they be user fees or leasing fees remitted
16 to the spectrum relocation fund to, in a sense,
17 offset those costs over a period of years.

18 CO-CHAIR ALDER: I do think we have
19 time for questions and to give the committee some
20 feedback.

21 CO-CHAIR GIBSON: So you mentioned
22 UTAM. Did you feel like, as you looked into that,
23 you ran afoul of the Receipts Act.

24 MEMBER RATH: Yeah.

25 CO-CHAIR GIBSON: It sounds like, also,

1 a lot of those recommendations are kind of above
2 the scope of what NTIA can do. Is --

3 MEMBER RATH: Well, I think the idea
4 was the first set were things that we thought they
5 might be able to do, seek clarification from OMB
6 and -- The last two pages were about legislation.
7 I mean, we took it to heart that we really wanted
8 to explore whether there was a way to do this
9 without having to go to Congress.

10 MEMBER CALABRESE: Part of the
11 rationale, too, on seeking clarification and
12 more -- you know, kind of drawing maybe some
13 clearer lines is so that agencies -- the federal
14 spectrum users could be informed about this so
15 that perhaps they could be more creative and
16 proactive in their own thinking. Because if
17 everything's just, you know, kind of reactive and
18 "Oh, by the way," you know, "after the auction we
19 figured out that you might be able to do this" --
20 But there may be some value in clarifying that
21 there's -- you know, there's greater flexibility
22 than is realized at the moment.

23 CO-CHAIR GIBSON: Well, you stir up a
24 lot of interest, I think, from external people. I
25 saw the list of people you met with. I wanted to

1 attend those meetings, but it was, like, bam, bam,
2 bam.

3 Good work.

4 CO-CHAIR ALDER: Bryan . . .

5 MEMBER TRAMONT: I want to thank
6 Michael and Charla for their great work, but the
7 two things I would just note is that I do think
8 Congress -- and the letters reflect this --
9 doesn't know what to do. And they're open to
10 doing more. They understand the economic
11 rationalization -- or are economically rational to
12 make that money available for other types of
13 spectrum use, but they're concerned about how to
14 cabinet it.

15 I think the work that you've already
16 done on that legislative piece is very, very
17 helpful and, obviously, it's not within the
18 purview of NTIA to, per se, do that, but to
19 encourage the Congress to do it. So -- And to
20 the extent CSMAC is suggesting a path, I think
21 that's super helpful.

22 And I do want to second the other
23 piece, which is getting guidance from OMB is so
24 difficult. And I feel like agencies constantly
25 struggle with what the boundaries are, and it's

1 just often easier to say no. I mean, you can
2 reflect on this from -- It's just a very
3 difficult thing for anyone to play outside the
4 box, and I think on both of these it would be
5 super helpful.

6 And I think it's a very -- this is an
7 excellent example of tangible work items coming
8 out of the committee, so I just wanted to second
9 the great work that was done here.

10 CO-CHAIR ALDER: Dennis . . .

11 MEMBER ROBERSON: I want to throw one
12 more piece into the stew, if you will. And this
13 is the -- really a reflection of the reality of
14 what's happening in the unlicensed world.
15 Unlicensed is increasingly being used for
16 commercial services, and we all see that day by
17 day. And real money is being extracted by those
18 significant commercial services and, in fact,
19 they're even becoming the dominant user of the
20 unlicensed spectrum.

21 So you can begin to think of unlicensed
22 spectrum as another form of spectrum sharing with
23 principals who are deriving great value from that
24 spectrum use. So though it's further down the
25 pike, some of the people who are deriving the

1 enormous benefit from using this would also seem
2 to be a source of monies that could be brought in
3 sort of -- though we'd have to come up with a
4 structure -- sort of in the same way that -- that
5 the -- as those who require the spectrum outright
6 through auction.

7 But it's one more piece that wasn't yet
8 into the mix, at least would be my thought, so I'd
9 throw that into the stew.

10 MEMBER CALABRESE: Yeah. And related
11 to that challenge is the frustration that although
12 it may be more advantageous -- Even if you looked
13 at it from a -- purely from a federal revenue
14 perspective, it may be more advantageous to be
15 receiving user fee revenue in perpetuity rather
16 than a one-time auction revenue. There's no way
17 to really do that under current law, apparently.

18 CO-CHAIR ALDER: Other questions or
19 feedback for this subcommittee?

20 I guess I have one question or
21 feedback, which is, if -- if an auction is really
22 a mechanism for the people who are going to derive
23 benefit to kind of pay for the use and the rights
24 and determine -- and it also determines who's the
25 preferred user as an allocation mechanism, if

1 there's other mechanisms, which are user fees and
2 stuff, what prevents that from being defined as a
3 type of auction and taking those fees and -- You
4 know, is there a really specific definition of
5 what an auction is?

6 MR. ROBERSON: This goes to the lawyers
7 in the room.

8 MR. KOLODZY: Or Wikipedia.

9 MEMBER CALABRESE: Well, what would
10 matter is the definition of an auction in CSEA,
11 the Commercial Enhancement Spectrum Act, which I
12 haven't looked back at recently. I'd be surprised
13 if it was quite that valuable, but . . .

14 MEMBER TRAMONT: I think it's in
15 cross-reference to the auction statute pursuant to
16 309J, which is mutually exclusive.

17 MEMBER CALABRESE: Which, you know, is
18 kind of the problem, because the whole premise of
19 309J is that is mutually exclusive.

20 MEMBER RATH: And which would say it
21 would be hard for what you suggested, Larry.

22 CO-CHAIR ALDER: Paul, you had a
23 comment, too?

24 MEMBER KOLODZY: I have just a quick
25 question. Michael, you made a comment which got

1 me confused, which was there was no mechanism to
2 do user fees or whatever currently. I thought I
3 remember -- maybe I'm misremembering -- that on --
4 for TV broadcasters, if they want to do it not
5 just for broadcasting purposes, but video content
6 free to use for others, they actually have an
7 ability to capture 5 percent of the revenue or
8 something like that.

9 So there are mechanisms that aren't
10 just -- Only once they can do that?

11 MEMBER RATH: No. No. No. But it
12 applies to broadcasters.

13 MEMBER TRAMONT: It's narrowly tailored
14 for broadcasters to use in broadcasting. The
15 administration and both political parties have
16 asked for spectrum fee authority, I think, for
17 over a decade and never received it.

18 MS. RATH: 15 years. You were -- You
19 were in grammar school, then.

20 CO-CHAIR ALDER: If you're on the
21 phone, sometimes we're getting a little -- Mute
22 would be helpful.

23 MS. ATKINS: I thank you for putting
24 this information together. I think it's a good
25 summary of options and it will allow us to

1 continue the dialogue. And though NTIA's role may
2 not be to lobby or change legislation, we have
3 many ongoing discussions to see how we can do
4 things in a more efficient and effective way. And
5 I think this area of discussion is specifically
6 the kinds of feedback that we were looking for.

7 And in particular, I did ask you
8 specifically to look at the legislative options as
9 well in terms of changing legislation, so I
10 appreciate the work.

11 Thank you.

12 CO-CHAIR ALDER: All right. Thank you.
13 I think with that, we'll move on into the next
14 phase, which is we have two subcommittees that are
15 considering future questions.

16 So the first one is the subcommittee
17 that I'm currently sharing, which is the spectrum
18 database subcommittee. We did circulate -- If I
19 can pull up my document, we provided -- The
20 subcommittee met and we discussed whether it was
21 productive to continue working. It's -- That's
22 the first question. Do we want to take on new
23 questions?

24 Originally, the NTIA proposed a second
25 question, which was how should the development,

1 implementation and maintenance of spectrum sharing
2 database be resourced; so getting back to the
3 resource question. So that question is on the
4 table.

5 The other question that has also been
6 proposed by the NTIA recently is do we need a
7 federal SAS? What are the minimum set of
8 characteristics needed to adequately share without
9 exposing sensitive information? What is the trade
10 between real time sensing and databases? Is the
11 database approach extensible to national
12 implementations?

13 So those are all questions that have
14 been proposed, and the subcommittee themselves
15 also were thinking that it might be interesting to
16 look at a particular band. The group said, for
17 example, bands that already kind of have a focus
18 where they think a SAS or a spectrum database
19 would be appropriate, 3.5, 5 gigahertz, millimeter
20 wave, perhaps the new 5G bands, looking at a
21 specific issue.

22 Other questions that the subcommittee
23 thought might be relevant would be to help
24 identify new bands that could be facilitated for
25 sharing with -- with this type of approach, and

1 then the final question that was debated or
2 suggested was how could the industry and federal
3 agencies develop an interference protection
4 criteria for the federal systems and spectrum
5 sharing database, protecting the federal interests
6 while maintaining the value of the shared
7 spectrum?

8 So there are a number of questions that
9 I throw out here for discussion. I thought we
10 would spend just two or three minutes, if there's
11 other questions regarding the use of spectrum
12 databases, facilitating spectrum sharing that the
13 group here at large thought might be worth
14 considering?

15 As we said, I think the process here is
16 that Paige is going to take some of those back.
17 Mark and I will work and we'll come up with some
18 new questions, but those are the ones that were on
19 the table. And I think a particular interest was
20 the original question about resourcing and then
21 the question about the federal SAS.

22 Questions or comments?

23 Paige . . .

24 MS. ATKINS: I do not recommend doing
25 all of those.

1 CO-CHAIR ALDER: No. We're going to
2 pick one.

3 MS. ATKSIN: Yeah, one or two maybe. I
4 do believe that the extensibility question is
5 important in terms of its sensibility in terms of
6 international implementation, so I would -- And
7 we'll discuss this more, but we'll definitely
8 prioritize and pick one or two.

9 CO-CHAIR ALDER: Other feedback? Other
10 suggested questions?

11 Dennis . . .

12 MEMBER ROBERSON: It's already in your
13 list, but I think this conjunction of the
14 databases and sensing, which has increasingly come
15 out in the 3.5, is really the important one. It
16 does tie off with some of the other things that
17 we've been doing, so that, along with the ones
18 that Paige referenced, seems like a really meaty
19 and important one, because often these have been
20 thought about as separate things. Either you
21 sense or you -- But the two really do have
22 considerable intersection

23 CO-CHAIR ALDER: Okay. Thank you. All
24 right. Then I think we also wanted to spend
25 another couple of minutes talking about potential

1 next questions for the -- I call it the
2 bidirectional sharing.

3 So I'll turn it back over the Janice.

4 MEMBER OBUCHOWSKI: I will first turn
5 it over to Paige.

6 MS. ATKINS: So we discussed NTIA
7 providing some additional input. In an overall
8 sense, what we want to do is shift it from
9 temporary sharing to I'll call it permanent
10 sharing, long-term sharing, however you want to
11 characterize it. And there are many elements to
12 that.

13 And, actually, Janice mentioned one
14 earlier that I had on my list as well, but what --
15 what would that regulatory and government
16 framework look like that enables flexible federal
17 access to non-federal spectrum? And,
18 theoretically, if you have more sharing and more
19 options for both federal and non-federal users,
20 you'd be better off. Whether that's true or not
21 may be another question.

22 And then how does this framework
23 balance regulatory certainty and predictability
24 that commercial users need to build out their
25 systems and provide services, but also that the

1 federal agencies need in terms of their long-term
2 planning and implementation and operational
3 requirements.

4 A third element -- and, again, these
5 are just for discussion purposes; and this is the
6 one Janice mentioned earlier -- we've moved toward
7 this policy of flexible use on a commercial -- for
8 the commercial services specifically; so
9 flexibility and technology neutrality. And what
10 would that look like as it is applied to the
11 federal users that may be sharing non-federal
12 spectrum?

13 And whoever is on the phone, please
14 mute.

15 And then collaboration, obviously,
16 that's going to be a key role as we move forward.
17 And in particular, what does that look like in
18 terms of our traditional regulatory approaches and
19 regulatory entities, like NTIA or FCC versus
20 direct coordination and collaboration, I'll say,
21 operator to operator. So how does that change the
22 reflection of what we do moving forward?

23 I have mentioned to Janice and the
24 subcommittee that we -- we are talking to the FCC
25 and -- specifically about bidirectional spectrum

1 sharing, and we are coming up with use cases that
2 we would like to focus on in that discussion. My
3 intent would be that we could provide some use
4 cases to bound the discussion, bound the
5 evaluation and then determine what -- what
6 questions really make sense in terms of priorities
7 we want to focus on.

8 So that's what I throw out to the
9 group.

10 MS. OBUCHOWSKI: Thank you, Paige.
11 Jennifer, are you still on the line and would you
12 like to respond? I -- I'm very comfortable with
13 the approach that Paige has articulated. There's
14 some logical next steps that come out of the
15 short-term process. I think everybody's looking
16 at red book changes, et cetera, et cetera, but
17 there's also the overarching philosophical
18 question, you know, when our CSMAC, for those of
19 us who were there, you know, several years ago
20 started looking at federal use, it was a very
21 static environment. You know, were people using
22 trunking enough? You know, there was the question
23 of satellites and, you know, what are the
24 protection criteria.

25 I think the AWS-3 tackled the latter

1 question, and the former one is just basically
2 rendered moot. We're just operating in a very
3 different world and, you know, these are sort of
4 big -- big statements, but, you know, we're seeing
5 recruitment by ISIS/ISIL over wireless networks.
6 We're seeing Google Maps being used for precision
7 targeting by our adversaries. We're seeing
8 satellites being used to detonate IEDs and, you
9 know, cyber is a threat across both hard --
10 satellite hard-wired and wireless networks.

11 And in this world, if we're to
12 hopefully retain our security postures, speaking
13 for the DOD, but also deal with these threats on
14 behalf of FAA, the FBI, et cetera, there needs to
15 be a new paradigm; so looking at it from a
16 principal overarching view and realizing that some
17 of this send signals.

18 You know, 16 years ago, when there was
19 flexibility given for folks who required PCS
20 licenses, nobody knew what would happen there, but
21 it unleashed, you know, a great deal of innovation
22 and progress. And some of this, which is on the
23 sort of day-to-day, you know, kind of direct
24 program addict level is critical, but the broader
25 policy signals need to come of this. They're not

1 going to come overnight, but they need to be
2 launched if we want to retain our leadership both
3 as a commercial power, but also as a secure nation
4 in the 21st Century.

5 So that's, I guess, where, as a
6 philosophical matter, I'd say perhaps some of us
7 would be coming from, but I think that could be
8 bounded in part by your case studies.

9 CO-CHAIR ALDER: Go ahead, Jennifer.

10 MEMBER WARREN: Thank you. I welcome
11 the specific use cases. One of the challenges
12 that we have is one of the early questions in the
13 temporary use ones was to have some specifics. It
14 was -- We actually counted on folks in Question 4
15 in the bidirectional report, but it wasn't really
16 a use case.

17 So I think this is a great way forward
18 to tackle the more difficult, but necessary
19 initial issues, and so I support that. Thank you.

20 CO-CHAIR ALDER: Is there any other --
21 We've got Dennis, but I'd also invite other
22 comments from people that might have suggestions
23 for this future work.

24 Dennis, go ahead.

25 MEMBER ROBERSON: I think it's already

1 been mentioned several times, but I'll just bring
2 it out in this context. That is the geographical
3 aspect to this, which has a very strong parallel
4 to some of the things that we've done within CSMAC
5 looking at the isolation zones, coordination zones
6 and the like; those exist on the commercial side
7 as well.

8 Sharing within the context of New York
9 City or Los Angeles or Chicago or wherever is --
10 is very, very difficult to conceive of and
11 probably unlikely to be something that would be of
12 strong interest either, particularly on the DOD
13 side. But as you move away from those intense
14 wireless utilization areas, there are zones around
15 the country where it's hard to find a signal.

16 And in those zones, the opportunity for
17 sharing and long-term sharing seems to be
18 significant. And I think we -- If we
19 contextualize some of the thinking around that
20 kind of model, it will be a helpful way for us to
21 move forward.

22 CO-CHAIR ALDER: All right. Any other
23 comments?

24 I think we'll wrap up this session.
25 I'll go ahead and thank everyone, all the

1 subcommittees again as a whole. Great job on the
2 reports.

3 I'm going to turn the meeting back over
4 the Mark.

5 CO-CHAIR GIBSON: Okay. Take that in
6 your own hands. Now we go for the spectrum update
7 from Paige, the NTIA spectrum update.

8 MS. ATKINS: And I will eat up the time
9 since we're ahead. Welcome to Boulder. It's a
10 beautiful place with beautiful weather. And as
11 Larry --

12 MEMBER ROBERSON: It snowed here three
13 days ago.

14 MS. ATKINS; Yeah, good timing. As
15 Larry mentioned, we're hosting the CSMAC
16 coincident to ISART. And does anyone remember
17 what that stands for? ISART is going to be a
18 tremendous symposium. We have great keynotes,
19 panels and tutorials. I think some occurred
20 today, so it should be a great time to explore
21 additional facets of spectrum sharing across
22 measurements, modeling and simulation
23 technologies, as well as regulatory approaches.
24 So I encourage everyone in this room to take full
25 advantage of being here this week if at all

1 possible.

2 Well, today we moved toward closure of
3 some very specific subcommittee questions and
4 recommendations and reduced the number of
5 subcommittees by one, the transitional
6 subcommittee. We've identified additional
7 interdependencies between the subcommittees and
8 continue to look for opportunities to streamline
9 and strengthen what we're doing, and we'll
10 continue to do that as we look at next steps.

11 And though our emphasis is to focus on
12 very practical and actionable recommendations, we
13 clearly are tackling issues that are recent.
14 Enforcement is a good one and will require further
15 study and dialogue whether specific
16 recommendations are viable and implementable.

17 So our focus today was twofold:
18 Continuing to close out our existing questions and
19 recommendations while exploring next steps. And
20 when we think about next steps, I'd like to give
21 you a quick update on some of the things that have
22 occurred since our last meeting. You'll see it's
23 quite a healthy list of activities, but I'll only
24 touch on a few.

25 Innovation, collaboration and spectrum

1 sharing are integral to our efforts to meet the
2 president's broadband spectrum goal while ensuring
3 that the government agencies -- the federal
4 government agencies have access to the ways they
5 need to serve the public. That's their mission's
6 requirement

7 These ideas are prevalent in the work
8 that NTIA did in collaboration with the agencies,
9 FCC and industry for coming to a successful AWS-3
10 auction. They were instrumental in the action on
11 3.5 gigahertz and continues to drive our efforts
12 to assess other bands for potential repurposing
13 and sharing.

14 And although the AWS-3 auction is over,
15 the heavy lifting just begins. As a reminder,
16 this process will include some cases of
17 compressing operations or relocating operations,
18 as well as some cases where there will be
19 indefinite sharing with both the 1695 to 1710
20 megahertz as well as 1755 to 1785 megahertz. And
21 for those systems that are relocating, it may take
22 up to 10 years for that process. However, we
23 expect significant sharing to occur in the interim
24 and a lot of coordination and collaboration to
25 occur during that time.

1 And that collaboration is really
2 absolutely critical, continued collaboration among
3 NTIA, FCC industry and the government agencies.
4 And that formal coordination will start occurring
5 in the next few months. Similar to AWS-1, NTIA
6 and FCC are working with industry, specifically
7 through CTIA and CCA. And if you aren't familiar
8 with CCA, it's the Competitive Carriers
9 Association, to host an AWS-3 government and
10 industry information exchange on June 4th. And if
11 those notifications haven't gone out, it's
12 intended to near term.

13 And this is to begin the informal
14 dialogue around expectations, processes and tools
15 that will facilitate the transition over the next
16 few years. Again, it's very similar to what we
17 did for AWS-1. This will include a high-level
18 discussion of the portals that will be used to
19 facilitate formal coordination, and I can't
20 emphasize enough that the continued communication
21 and collaboration among all of us will be critical
22 to ensure successful transition and interim
23 sharing during that transition period.

24 In another important step toward to
25 meeting President Obama's goal of 500 megahertz of

1 federal and non-federal spectrum for broadband
2 20/20, last month, as was mentioned earlier, the
3 FCC unanimously voted to create a citizens
4 broadband radio service in the 3.5 gigahertz band.
5 And this innovative regulatory framework enables
6 the -- them to access to 150 megahertz, so it's
7 actually 150 megahertz, 3550 to 3700, of which the
8 bottom 100 megahertz is shared with military radar
9 systems. And then you also have commercial SATCOM
10 systems in that band.

11 NTIA's fast track report in 2010
12 proposed further sharing of this band between
13 federal and non-federal users as long as
14 geographic exclusion zones were used to protect
15 the critical radar operations, but we understood
16 that large exclusion zones minimize the market
17 potential of the band. NTIA engineers, in close
18 collaboration with DOD and FCC staff, spearheaded
19 groundbreaking analysis and modeling techniques
20 which resulted in significantly reducing those
21 exclusion zones. And the detailed analysis
22 methodology will be coming out in print, so it
23 will be an NTIA technical note.

24 And the intent there is to provide as
25 much information as possible so folks can

1 replicate, you know, how it was done and how the
2 exclusion zones were formulated, so we'll let
3 everybody know when that is published. These
4 results, along with an innovative three-tier
5 priority-based regulatory framework that is
6 enabled by technology -- and I'll go back to
7 that -- minimizes the impact of these zones.

8 The key technologies which have been
9 mentioned are spectrum access systems as well as
10 sensing, and those two technologies, if
11 successfully implemented the way we think we can,
12 could ultimately erase the exclusion zones all
13 together. And that really is our hope. But to be
14 clear, there's a lot of work yet to be done. But
15 we have the regulatory framework in place now to
16 move forward and prove out this new sharing
17 approach.

18 A fundamental proof point will be the
19 protection of incumbents. Again, that's not just
20 military radar, but it's also commercial satellite
21 communication services. And as Larry mentioned,
22 CSMAC's contributions on spectrum sharing has
23 helped us shape our thinking of 3.5 and will help
24 us address future challenges. So as we maybe
25 identify specific key-focused areas, we may be

1 coming back to the CSMAC to help us peel those
2 back similar to what we did for AWS-3.

3 As I mentioned during our last CSMAC
4 meeting, NTIA, and particularly the Institute for
5 Telecommunication Sciences or ITS in Boulder,
6 continues to expand their spectrum monitoring
7 pilot, 3.5 gigahertz. They're working with
8 federal agencies to leverage existing government
9 locations and facilities to host four additional
10 sensors this fiscal year, and potentially expand
11 our coverage beyond just 3.5. So that's an
12 exciting element that I hope we reach this fiscal
13 year.

14 ITS, in collaboration with NIST, is
15 developing a measured spectrum occupancy database,
16 and that we did discussion last time as well. And
17 that's intended to make the sensor information
18 available on a near realtime basis to support
19 policy, planning, engineering and eventually
20 potentially dynamic sharing. And though we are
21 still in the early phases of characterizing the
22 utility of this kind of monitoring, we look
23 forward to integrating what we learn from the ITS
24 pilot with the recommendations that have come out
25 of the CSMAC so we have a good way forward.

1 I encourage you to attend ISART
2 tomorrow. In particular, both ITS and NIST will
3 be talking about their spectrum sharing research
4 and activities to include 3.5 gigahertz. I think
5 that's in the afternoon -- the afternoon session.
6 And we also continue to examine the potential for
7 sharing at 5 gigahertz -- and the two bands we're
8 focusing on are 5350 to 5470 and 5850 to 5925 --
9 between federal systems and unlicensed devices,
10 specifically UNII, so Unlicensed National
11 Information Infrastructure devices, and we
12 continue to work with the federal agencies as well
13 as the FCC and industry particularly on the lower
14 band, lower 5350 to 5470, to assess options for
15 potential implementation, which is supporting not
16 only domestic -- potential domestic
17 implementation, but also to future work agenda --
18 on radio conference agenda item to look at that
19 band for international harmonization.

20 We continue to refine our analysis
21 approach to include the addition of dedicated
22 detector approaches that have been proposed by
23 industry, and we are on target to complete initial
24 testing to baseline current capabilities --
25 current commercial capabilities by June of this

1 year. So we'll get some early results on how well
2 current devices can handle this sharing
3 environment. There are no easy answers,
4 unfortunately, but we are exploring all potential
5 options, again, in collaboration with industry and
6 the other agencies and FCC.

7 Now, for the upper 5 gigahertz band,
8 that's a challenging one as well. NTIA, FCC and
9 the Department of Transportation will be meeting
10 with the house energy and commerce committee next
11 week to discuss this band, clearly demonstrating
12 their continued bipartisan interest to assess the
13 potential for additional unlicensed spectrum in
14 the band.

15 So while we remain busy working all of
16 these domestic priorities, we cannot forget that
17 we're in the throes of preparation for the World
18 Radio Communications Conference 2015 or WRC '15.
19 And we're addressing many interrelated priorities,
20 each -- And for those not familiar with the WRC,
21 each WRC is held approximately every three to four
22 years, and it revises treaty level radio
23 regulations with -- which allocate and govern how
24 radiofrequencies and satellite orbits are used
25 globally.

1 The U.S. had a very successful
2 conference preparatory meeting that was at the end
3 of March into early April in Geneva, and they drew
4 more than 100 delegations to the table. There are
5 about 109, roughly, in the ITU, and this was to
6 complete the technical foundation for November's
7 conference. Now, the two top U.S. priorities for
8 WRC '15, number one is international mobile
9 telecommunications, IMT wireless broadband. Go
10 figure.

11 The second priority is the
12 determination for beyond line of sight command and
13 control -- spectrum for beyond line of sight
14 command and control links for a manned aircraft
15 system. So those are the two top priorities.
16 I'll focus on the first one.

17 You know, the challenge for mobile
18 broadband services is the same internationally as
19 nationally. The most suitable bands are already
20 being used by other services, for things like
21 broadcasting and satellite services. To address
22 this, the United States delegates at CPM worked to
23 advance proposals that emphasize sharing of
24 spectrum and sharing with existing services. So,
25 again, a similar theme to what we're doing within

1 the U.S.

2 Two of the U.S. proposals for INT align
3 with 3.5 gigahertz, as well as the future
4 incentive auction. And then there's a third
5 proposal that is an L-band, roughly, I think, 1425
6 to 1518 that the U.S. is supporting, but we would
7 not implement within the U.S.

8 We're also seeing an increasing
9 interest in bands above 6 gig, particularly for
10 5G implementation. We believe that that might
11 become a future agenda item as well for WRC '19 to
12 start assessing bands above 6 gigahertz. So my
13 takeaway here is that we can't forget about the
14 international implications on our domestic policy
15 decisions and vice versa. So they're all
16 interweaved one way or another overall.

17 We are still excited about the concept
18 of Model City for demonstrating and advancing
19 spectrum sharing technologies and approaches and
20 realistic and scalable environments. NTIA and FCC
21 held a Model City workshop in April facilitating
22 discussions on the concept, case studies,
23 governance, what would that look like,
24 technologies. And there are still a lot of -- of
25 those issues that are up in the air, I'll say.

1 And the workshop was attended by over 80 folks,
2 which was great, representing government industry
3 and academia, and we're using the results of that
4 workshop to help frame our next steps.

5 So you'll be hearing more about how
6 we're going to move forward over the next few
7 months. So good dialogue, but we're still really
8 crystallizing what does it mean and how do we move
9 forward.

10 We continue to improve data
11 transparency into existing federal spectrum use.
12 Last April -- and this was April of 2014 -- we
13 unveiled what we call spectrum.gov, a new on-line
14 tool that provides band-by-band descriptions of
15 federal spectrum uses between 225 Megahertz and
16 5 gigahertz, including a summary of frequency
17 assignments authorized by NTIA. That's one of
18 Pepper's favorite tools.

19 Our most recent update, which occurred
20 earlier this month, includes additional ways to
21 navigate and assess current and archived band
22 reports, the ability to download a limited data
23 set, the data set that we use to create those
24 reports and particularly some of the graphics in
25 those reports, and an improved explanation of the

1 material that was being presented.

2 We're already planning our next steps
3 and improvements to include enhanced search
4 capabilities, download capabilities and archive
5 navigation, and those enhancements are targeted
6 for the end of the calendar year. And if you have
7 any input at all in terms of the usefulness of the
8 tool or -- We are also assessing extending bands
9 above 5 gigahertz, so any feedback would be
10 helpful to us as we continue to make improvements.

11 Now, NTIA has continued to enhance our
12 dialogue with industry in parallel to CSMAC's
13 efforts to provide us feedback and recommendations
14 on government industry collaboration. It is very
15 important for us to create a more sustainable and
16 repeatable framework and strengthen the areas that
17 we perceive as gaps in that framework.

18 We had, in particular, multiple
19 sessions with various industry associations over
20 the last three months, and some of the members,
21 obviously, and some of you actually participated
22 in those discussions. And we're really
23 appreciative of industry's engagement and belief
24 that the associations can play a key role in
25 helping us get to where we need to be as part of

1 this multi-layered framework for collaboration.

2 We will assess the recommendations
3 coming out of the subcommittee and integrate it
4 with our ongoing dialogue, and we will chart a
5 path forward, because this is extremely important
6 to us and all of our activities in the future.

7 And last but not least, I wanted to
8 reiterate what Larry mentioned, that in March, the
9 Department of Commerce and Department of Defense
10 signed a memorandum of agreement to facilitate
11 access to a wide range of laboratory test
12 facilities that support development of improved
13 methods of spectrum sharing.

14 The National Advanced Spectrum and
15 Communications Test Network or NASCTN was
16 established under this agreement and is an
17 important adjunct for the Center for Advanced
18 Communications. And the CAC really is key to
19 implementing some of the recommendations out of
20 the last president's memo, particularly to further
21 research development, testing and evaluation of
22 spectrum sharing technologies and other wireless
23 related efficiencies.

24 NIST, NTIA and DOD's CIO signed the
25 agreement on March 11th, and as Larry mentioned,

1 the charter will be developed over the next few
2 months; that will be coming out. And in
3 particular, it is important to realize that, then,
4 we will be working to bring on additional federal
5 agencies as well as industry as part of this
6 process, because it's all about understanding
7 interactions and creating trusted results so we
8 can move forward in ways we may not have been able
9 to before.

10 NASCTN will rely on a network of
11 members, those that I just mentioned, and the
12 members will be sharing intellectual capacity, not
13 property, modeling and simulation capabilities,
14 laboratory facilities and test ranges. And,
15 again, it will provide us coordination of tests,
16 modeling and validation that will provide
17 stakeholders with objective and trusted
18 information so we can really assess the
19 performance of these technologies and techniques
20 and find solutions to coexistence, which is very
21 important.

22 Ultimately, the intent is to accelerate
23 the deployment of spectrum sharing technologies,
24 increase spectrum access, both federal and
25 non-federal users, and inform ongoing and future

1 spectrum policy decisions.

2 As you can see, we've collectively been
3 pretty busy the last three months. I think we've
4 made a lot of progress and the momentum continues.
5 We have much work ahead of us, and we are
6 appreciative of the collective wisdom of this team
7 to help us succeed in this new spectrum world.

8 Any questions?

9 CO-CHAIR GIBSON: Go ahead, Michael.

10 MEMBER CALABRESE: Paige, I may have --
11 I may have completely misunderstood this, but if I
12 didn't, I was hoping maybe you could tell us a bit
13 more. I heard you say that the sensing -- the
14 sensing network that may be -- well, that probably
15 will be deployed in 3.5 gigahertz to try to move
16 TO coordination zones, that NTIA is exploring
17 whether that same sensing network could be used
18 also for 5 gigahertz to improve access there?

19 MS. ATKINS: That, I don't think
20 I said, but we are looking at options at
21 5 gigahertz which include dedicated detectors or
22 sensing elements. So similar concepts, but not
23 necessarily feeding directly.

24 MEMBER CALABRESE: So just -- Is it
25 wishful thinking that there could be a piggyback

1 that would be more efficient, if that's of
2 anybody's --

3 MS. ATKINS: In terms of lessons
4 learned from one to the other, yeah.

5 MR. CALABRESE: Well, rather than
6 multiple sensing networks, for example.

7 MS. ATKINS: Oh, in terms of what that
8 might look like over time, there are a lot of
9 things feeding that ultimate recommendation. You
10 know, we've got the ITS spectrum monitoring pilot.
11 We've got the recommendations from here. We've
12 got activity in 3.5, activity in 5. We aren't
13 quite there yet in terms of how -- how do we
14 synergize all of those elements to ensure that we
15 are not duplicating and we are creating something
16 that is economical and useful, but I don't think
17 we're there yet.

18 And in the different bands, there are
19 different incumbents and different systems that
20 may require a little bit different techniques.

21 MEMBER CALABRESE: Right. And
22 different geographies.

23 MS. ATKINS: But that's definitely
24 something that we'll be looking at.

25 MEMBER CALABRESE: Thank you.

1 CO-CHAIR GIBSON: Any more questions?

2 All right. What do you guys do in your
3 spare time? That's quite a list. Thank you. I
4 confirmed that the announcement of the symposium
5 came out earlier this afternoon, so industry
6 should have gotten it.

7 MS. ATKINS: Okay. Great. For June?

8 CO-CHAIR GIBSON: For June, yeah. Is
9 Pierre here? I'll take that as no.

10 What we'll do, then, is we'll move
11 toward public comment here. So opportunity for
12 public comment. Any public comment in the room?
13 Any public comment on the phone?

14 And Pierre is here. Wow, that timing
15 is brilliant.

16 MS. ATKINS: Can I clarify one thing
17 from the ether, please. So there was a question
18 on the June 4th industry government exchange. The
19 question was, is it correct that NTIA and FCC are
20 working with CTIA and CCA on that? That is a
21 correct statement. CTIA will be hosting in their
22 location, and it is jointly sponsored by CTIA and
23 CCA and bringing in their membership to talk about
24 how we are moving forward from the AWS-3
25 coordination perspective.

1 Thank you.

2 CO-CHAIR GIBSON: Do you need a moment
3 to set up, Pierre?

4 MR. DE VRIES: Oh, no. Thanks.

5 Well, there's nothing like walking into
6 a room completely cold. I hope the warm-up acts
7 were good.

8 CO-CHAIR GIBSON: We've been here since
9 1:00, so we're hot.

10 MR. DE VRIES: Well, you missed a great
11 presentation on SEMCAT over on the other side.

12 Thank you very much to Larry and Mark
13 for inviting me and allowing me to speak. What I
14 wanted to do was to just give you a quick brief on
15 some work that happened last year with the FCC
16 attack in the spectrum working group. It's work
17 that's ongoing. I am speaking purely on my
18 personal -- my personal capacity. The working
19 group knows I'm here and they're happy with that,
20 but any comments are my own.

21 So what I wanted to do was to just
22 frame for you what we're doing on risk informed
23 interference assessment. One of the things I
24 learned hanging out with some federal people is
25 there's this wonderful explain "BLUF" which

1 doesn't mean what I always thought it meant. It
2 means bottom line up front. And so the bottom
3 line up front is that quantitative risk assessment
4 can complement worst cases, which is what we've
5 always done, and lead to more intensive
6 coexistence of radio systems.

7 So let me just explain that to you.
8 You should have somewhere a handout. It's just a
9 couple of pages, so you can just read down or do
10 your mail if you are uninterested in these
11 comments. If there are any comments, please feel
12 free to interrupt.

13 CO-CHAIR ALDER: Is that handout here?

14 CO-CHAIR GIBSON: He's going to
15 distribute it.

16 MR. DE VRIES: Okay. Good. So this --
17 Let me just give you the context, all right. At
18 the heart of spectrum regulation, at least the way
19 I've experienced it, is this question about
20 whether the spectrum manager should allow a new
21 radio service to operate. And that really is a
22 tradeoff, because there's a balance between the
23 benefit of the new service and then the risk of
24 harm to the old service.

25 And, traditionally, the way that that

1 assessment has been done has been done using
2 something called worst case. I've even heard
3 something called reasonable worst case, which
4 sounds like a contradiction in terms and my head
5 explodes. I don't know what that means, but
6 typically, worst case means, more or less,
7 something out of the tail of the distribution.

8 And because it is out of the tail of
9 the distribution, it leads very often -- or it can
10 easily lead to overconservative allocations, which
11 essentially means that one provides more
12 protection than is necessary to the service being
13 protected and one doesn't allow enough benefit for
14 the incoming system.

15 Now, there is an alternative -- That's
16 the alternative that we've been working on in the
17 TAC that's based on quantitative risk assessment.
18 Now, the interesting thing is that's been used for
19 decades now in a whole host of other regulated
20 industries. I'll talk about a couple of those in
21 the -- In the little handout you've got, I list a
22 whole bunch of them, but it's a very well
23 understood technique, at least outside of
24 spectrum.

25 So let's just talk a little bit about

1 worst case versus interference risk. So worst
2 case, I think of, as a single scenario that has
3 the most severe consequence. Regardless of its
4 likelihood, you're really worried about the
5 consequence. And, you know, the nature of RF
6 interference sort of works against worst case,
7 because there are many causes and many
8 consequences, maybe ways in which RF interference
9 can work. So there are many scenarios, and the
10 parameters that drive the amount of interference
11 can take a whole range of values.

12 So selecting a single value isn't
13 representative. Two examples of which it isn't
14 representative is, one, it might turn out that a
15 moderate effect -- and that is actually relatively
16 common -- might be more problematic than this
17 single case, which is really bad. That might just
18 not happen often enough to really affect the
19 system.

20 It may also be that if you fixate on
21 one particular hazard mode, you tend to ignore the
22 others, and it may turn out that one of those
23 others is more important. My favorite example is
24 when we were looking at -- or when you were
25 looking at ancillary terrestrial components into

1 GPS, all the analysis at the beginning of the
2 process was out-of-bound mission. But it turned
3 out, 10 years late, when the rubber hit the road,
4 that the thing that really was the problem was
5 adjacent band interference, which really wasn't
6 focused on at the beginning of the process. So
7 that's why I say that the worst case approach is
8 intrinsically conservative.

9 Now, it's actually a very sensible way
10 of doing things, because you might ask, you know,
11 that old thing of "You're so smart, so why aren't
12 you rich? You know, if this is such a good
13 approach, why aren't we doing it now?" And I
14 think of the days when spectrum rights weren't as
15 valuable. When the cost of wide guard bands or
16 large exclusion zones were relatively small, it
17 wasn't an issue, but it's no longer tangible as we
18 try to pack all things in.

19 So let me define "risk," which is the
20 term you'll hear a lot in this kind of
21 conversation. And the vernacular, "risk" really
22 means probability. But in engineering parlance,
23 risk is often defined as the combination of
24 likelihood and consequence, so the combination of
25 the probability and the impact, and typically

1 folks talk about the risk triplet. So, you know,
2 what are the things that can go wrong? Second,
3 how likely is each of those things to happen? And
4 then third, what are the consequences for each of
5 those things? And the next step up is, so what is
6 the purpose of doing a risk assessment?

7 So, for example, if you take the IEC
8 Standard 31010, it says that -- the definition is
9 to provide evidence-based information and analysis
10 that can inform decisions on how to deal with
11 risks and choose between options. And the reason
12 why I read that out is that the purpose of risk
13 analysis is not to make decisions. It's to
14 support the decisionmakers. So in the FCC world,
15 the decision would be made by the political
16 appointees and the engineers will provide the risk
17 analysis.

18 Now, in spectrum management, what are
19 the risks? Well, the risk is harmful interference
20 and the choices between the various different
21 service rules. And if you apply this technique,
22 then, in spectrum, you get what we call risk
23 informed interference analysis. As I mentioned,
24 it's being -- the overall technique has been used
25 in many industries, and in the little handout, I

1 actually give three examples.

2 The one that we analyzed a bit last
3 year, just because it was an area where safety of
4 life was really important, was the Nuclear
5 Regulatory Commission. NRC is also interesting,
6 because they really were the pioneers in the U.S.
7 of this technique. They actually -- The idea of
8 probabilistic risk assessment for nuclear power
9 plants started in 1967. In the U.S., it really
10 started being adopted in the '70s. There was a
11 policy statement saying, "Gee, this is a good
12 thing. We should use it more in the mid-'90s."
13 And then in 2009, the NRC published a regulatory
14 guide that sort of enshrined how one would use
15 this technique to get changes to power plant
16 licenses.

17 But, you know, there's lots of other
18 agencies, you know, like the FDA, the EPA, NASA,
19 FAA -- In fact, when you look at cyber security,
20 it's used by Homeland Security. You know, the
21 NIST standard for cyber security has got a lot of
22 this risk assessment stuff built into it. But
23 we're interested in spectrum, so our working group
24 suggested a three-step method. And I'll outline
25 the three steps and just say a few words about

1 each.

2 The three steps are -- And it maps a
3 bit to the risk trip that I mentioned earlier. So
4 the first is make an inventory of all the hazard
5 modes. The second step is define a consequence
6 metric or actually metrics, plural. And then the
7 third is assess the likelihood and consequence for
8 each of these modes and then aggregate them.

9 Now, number one, inventory. That's
10 relatively straightforward. It's the kind of
11 stuff that's the bread and butter of this group.
12 You know, it's all the usual suspect code channel,
13 out-of-band, adjacent band, intermode, spurious
14 (phonetic) blah, blah, blah, all those kinds of
15 things. And depending on the situation, you may
16 also want to think about malicious jamming. You
17 may want to think about intentional versus
18 unintentional, but it's all the usual stuff.

19 Thinking about the consequence metric
20 is harder, and the reason why the consequence
21 metric is harder is there really isn't one, and
22 they come in different sorts of flavors. And so
23 we actually sort of thought about building up from
24 the engineer three kinds of level. The first is
25 the RF metrics. So these are things like, you

1 know, interference over noise ratios or carryover
2 interference ratios or absolute signal levels. So
3 those are the kinds of things that Monte Carlo
4 models typically spit out, and those are the kinds
5 of thing we can model. However, what we're trying
6 to protect when we're trying to avoid harmful
7 interference is service degradation.

8 So then we talk about things like
9 availability. What percentage of time or how many
10 times is the service unavailable? Or how much is
11 throughput degraded? How much is radar range
12 degraded? And then, actually, that may not be
13 sufficient either, because in the end, what you're
14 really interested in is an organizational metric.
15 In other words, things like, on the commercial
16 side, profitability and on the government side,
17 you know, I've got a mission. Am I able to
18 complete my mission?

19 The -- The interesting issue with
20 consequence metrics is you can define many of
21 them, but when it comes to making a decision, the
22 decisionmakers usually want only a small number of
23 them and you'll need to pick -- select one or two.

24 Once you've done that, though, then I
25 think it's relatively straightforward,

1 particularly if your consequence metrics are the
2 RF metrics, to calculate the likelihood
3 consequence pass. This is why I was learning
4 about Monte Carlo models when I was playing hooky
5 from your meeting, because Monte Carlo really is a
6 technique that is well-suited for doing this kind
7 of thing. That's the easy bit.

8 The harder bit, actually, is combining
9 different kinds of hazard modes. So, for example,
10 you might get one hazard that is high likelihood
11 but low impact, and so that might be a rise in the
12 noise floor. And then you have another one which
13 is very low likelihood, but very high impact,
14 let's say malicious jamming; somebody is actually
15 out to get you. And it may be that the rules that
16 you set up would affect those differently.

17 So there will have to be a balancing.
18 And this, in a sense, is sort of above the
19 engineer's pay grade, where the engineer -- where
20 the executive decision-makers are going to have to
21 make that tradeoff which one do they weight more
22 heavily. What the risk assessment will be able to
23 do at least is to provide the raw material for
24 that judgment.

25 So let me close by just talking a

1 little bit about the way forward on this. Given
2 the success of risk informed methods in many, many
3 other areas, I'm pretty sure it can be applied and
4 it will be useful in spectrum. But, also, you
5 know, when one looks at how long it took, for
6 example, in the nuclear industry, it took decades.
7 And there were technical reasons why it took
8 decades. I mean, they didn't have decent compute
9 power until about 2000. And it's going to take
10 us, as a community, time, because there are
11 technical questions about "So how does this stuff
12 work for spectrum?"

13 But I think the more challenging thing
14 that's really going to make this take a decade
15 perhaps is a culture shift, because we are
16 changed -- You know, to do this will mean not
17 just looking at worse case, but thinking about
18 worst case as just one input and thinking about
19 this holistic balancing between likelihood and
20 consequence for a range of hazards more broadly
21 will take a change in emphasis.

22 Now, what can one do to get the ball
23 rolling? The committee -- The working group --
24 The TAC working group made a recommendation to the
25 -- to the TAC, and then the TAC to the FCC.

1 There's a couple of things that the FCC could do.
2 It's for folks at NTIA to think about how this
3 might apply there and perhaps for you eventually,
4 but one thing is just to use quantitative risk
5 assessment in the agency -- in the spectrum
6 manager's own work and ideally to actually publish
7 it. And it may well be that the work is already
8 going on to some extent. I haven't found any of
9 it, but it's really important to publish it so
10 other people can look and learn from how that was
11 done.

12 Another thing that one can do is to
13 pilot the application of these techniques. So
14 pick something which has limited scope. In the
15 FCC case, it might be waiver applications in a
16 particular city or a particular location. So
17 those things already take 12 to 18 months. They
18 have an extensive record already, so it's not as
19 if we're going to add a huge additional burden by
20 asking folks to try the method as well, but at
21 least we'll be able to see.

22 As far as the operators in the room, I
23 think there's at least the prima facie case that
24 using these kinds of techniques will help you with
25 your bottom line if you apply them to just making

1 your own decisions about what you deploy, where
2 and when.

3 So as I said, this is going to take
4 time. The sooner we start applying these methods,
5 the more conversations like this we have, the
6 better. That's why I'm so grateful for the
7 opportunity to just float these ideas today. The
8 sooner we start, the better. We don't need to
9 start big. That's why we ended up with the tag
10 line "Start small, but start soon."

11 My sense is that this work is still too
12 young, it's still too raw to really be a topic for
13 CSMAC. Maybe in a few years it will be, but if
14 there's anybody in the room who's interested in
15 following up more or who have suggestions and
16 advice for us, please get in touch.

17 Thank you. Any comments or questions?

18 CO-CHAIR GIBSON: Okay. We have a
19 couple. Rick was first up, and then Bryan.

20 Rick, go ahead.

21 MEMBER REASER: Rick Reaser, Raytheon.
22 I'm a big supporter of this. It would be
23 interesting to see how you would actually apply
24 this. We tried this with the federal agencies
25 before, when I was in GPS. It didn't work at all.

1 It's basically the people want to go right to the
2 worse case.

3 I remember one of them was the threat
4 of a handset to a GPS receiver on an airplane, and
5 the scenario was, well, the airplane is flying
6 inverted on -- over final approach and is heading
7 over a road where there could be a person sitting
8 with a handset, and they -- and it jams the GPS.
9 So that was kind of -- or one of the scenarios
10 that was posed.

11 I said, "If you're flying inverted on
12 final approach and you're 400 feet from the
13 ground, I think you've got some other issues
14 here." But we saw that movie where the guy flew
15 inverted for a long time, so maybe I was wrong. I
16 don't know.

17 CO-CHAIR GIBSON: Yeah, and he crashed.
18 He was drinking.

19 MEMBER REASER: So, anyway, I think
20 what would be interesting to do would be to try to
21 apply -- or to try to actually put an ITU paper
22 together to do this. We've actually tried this in
23 the past, but if you submit a sharing study that
24 uses this -- Because most of those sharing
25 studies that are done in ITU that I've been

1 involved with and written some of these, they're
2 all based on worst case.

3 The only exception -- I would say that
4 some of the work done that was done on EPFD,
5 although I'm not totally sure I understand
6 everything the French were doing on that, but --
7 but that seemed to be more along that line of
8 where it didn't take worst case. If you took a
9 worst case EPFD number, you would definitely fail
10 just about everything. But I would suggest trying
11 in a real world putting it together and seeing how
12 far you get with that.

13 The other thing is to write a
14 methodology and then propose that to the ITU. I
15 think that's where this is going to have to start,
16 because once -- once -- I don't think -- You'll
17 get somewhere domestically maybe, but unless
18 there's a published work that says here's how you
19 do it, here's how it's used, here's the steps you
20 go through, and you get that into some kind of IT
21 wire, MDOT, whatever or whatever -- whatever
22 the -- that is, you're not going to get very far.
23 But I think if you went to the working group that
24 talks about how we do interference analysis and
25 started to write a paper, because there are

1 questions -- open questions in ITU about this --
2 that would be, I think, a good place to start.

3 And I think you'd find some takers
4 internationally on this, but the problem you get
5 up against is like the one you said. You assume
6 your 9 Sigma case, and that means nothing can
7 share with anything and nothing can be done and
8 you're -- and then you're putting -- you put the
9 entrant in the -- in the role of proving a
10 negative, and that's almost impossible.

11 CO-CHAIR GIBSON: Thanks, Rick. Did
12 you want to comment?

13 MR. DE VRIES: I just want to make a
14 quick comment. Very good advice. Thank you.
15 I'll follow up on that.

16 I just want to underline that as far as
17 we were concerned, or definitely as far as I'm
18 concerned -- so we'll just say as far as I'm
19 concerned, this is not a replacement for worst
20 case.

21 Worst case is part of the analysis.
22 One of the reasons why -- I know the nuclear
23 industry have started -- They learned -- They
24 say risk-informed regulation, not risk-based. So
25 all these factors need to play in. And in fact,

1 the worst case is very -- It is important. What
2 I would say is for the worst case, if possible,
3 attach a probability to it.

4 CO-CHAIR GIBSON: Okay. Thanks.

5 Bryan . . .

6 MEMBER TRAMONT: Two quick questions.
7 This is all very interesting stuff. One is, is
8 there a situation that you-all ran into on the
9 commercial side where you feel like it's the
10 perfect example where this would have been -- led
11 to a different result where you found it was
12 particularly useful?

13 Two, what are the characteristics of
14 commercial band sharing arrangements that would
15 have lent itself to a case study? So is there
16 something about the nature, you know,
17 non-ubiquitously or non-consumer or high power
18 or -- You know, what are sort of the
19 characteristics that we would look for if we were
20 looking for a test bed for a student or a client
21 paper, perhaps -- or a client petition requesting
22 this sort of treatment for an individual band?

23 MR. DE VRIES: Yeah. So we have been
24 thinking about a number of cases. I think that
25 there are -- you know, historically there are

1 cases where I think this could be -- this could
2 have been useful.

3 The case that I will cite is not one
4 that I want to revisit, but I will -- So that
5 having been said, I think it would have been
6 interesting to use this -- this analysis in 2002
7 for GPS, where you have two very distinct
8 services; you have safety of life questions and
9 you have questions about what all the hazards are
10 in that one. But I wouldn't have started with
11 that one, because it's too complicated.

12 There are -- So if I jump to a very
13 simple system, if you're just looking at
14 coexistence between frequency division duplex and
15 time division duplex and, you know, you say, well,
16 are people coordinating or are they not
17 coordinating? That one you can do pretty
18 straightforward.

19 Another one which has a disadvantage of
20 being still a live issue in many cases, but it has
21 the advantage of being a global issue, is cellular
22 into television, when you're re-packing, let's
23 say, the 600 or 700 megahertz band.

24 CO-CHAIR GIBSON: So we'll do Dennis,
25 then Paul and then Mike.

1 MEMBER ROBERSON: The first comment is
2 another -- My first comment is you made, at the
3 very end, the comment that you thought that it was
4 too immature for CSMAC but that it was perfectly
5 fine for TAC. And I'm adding the last part there.
6 Could you comment a little bit more about that,
7 why you think it's too immature to be addressed by
8 CSMAC?

9 MR. DE VRIES: The reason I said that,
10 really, is I was managing my own expectations.

11 MEMBER KOLODZY: Set the bar low.

12 MR. DE VRIES: I would be deliriously
13 happy if people on the TAC were really the task
14 engineers to help us do one of these case studies.

15 MEMBER ROBERSON: CSMAC?

16 MR. DE VRIES: Sorry. Freudian slip.
17 Yes. Yeah. So I think the other reason why I
18 felt it was immature is, you know, you have a list
19 of how many -- seven, this time, working groups
20 already.

21 CO-CHAIR GIBSON: Six. we just sunset
22 one, so . . .

23 MR. DE VRIES: There's a very full menu
24 of the CSMAC, and I think that there is some
25 work -- There are open questions. This is not

1 something that's fully baked. You know, I think
2 that, you know, academics and researchers still
3 need to play with things at the edges, which is
4 why I want to manage expectations.

5 MEMBER ROBERSON: A second one, if I
6 can, is that dissimilar services have not deployed
7 this approach at all, but some homogeneous
8 services have. So there is a model within the
9 wireless homogeneous services using risk-based
10 decision-making. I mean, that's -- Cellular does
11 this all the time. It's a standard practice with
12 a slightly different twist to this. But in terms
13 of sorting how a cellular system works, you -- you
14 work very hard to ensure that it just barely
15 works, and that -- that involves, in a certain
16 sense, this same risk associated approach to life.

17 And that's different because it's
18 homogeneous. It's different because a single
19 entity has control, but there are lessons there
20 that are applicable in my mind. And I will defer
21 to some of my colleagues in the -- that are
22 directly in the cellular business, but I think
23 that is an important thing to take into --

24 MR. DE VRIES: I was surprised that I
25 didn't find any examples of risk assessment the

1 way that I -- that other industries use it in
2 cellular. It may just be my ignorance. I'd love
3 to get references.

4 CO-CHIAR GIBSON: Paul . . .

5 MEMBER KOLODZY: Maybe you are -- Oh
6 thank you. Maybe you're covering this in your
7 analysis, but I think that, to me, it's a very
8 difficult portion of it that you have half of the
9 equation. You have -- Usually the words are risk
10 benefit analysis. And when you're going to
11 agencies that are trying to understand the benefit
12 for doing certain actions and the risk that
13 they're having associated with those actions with
14 respect to interference or limitations of capacity
15 for particular folks, it allows you to start
16 asking some very interesting optimization
17 questions.

18 Maybe not in all cases -- I'm not
19 trying to say it's ubiquitous across all
20 possibilities, simply because trying to get the
21 equations to have the same units on either side of
22 the equation will be very difficult.

23 Have you thought about the next step in
24 getting into the risk and the benefits?

25 MR. DE VRIES: Yeah. Yeah. We -- We

1 have thought about it wistfully, in the sense that
2 we know that it's important. We know that in
3 other industries they do risk and cost benefit
4 analyses together. I've started talking to
5 economists and saying, "Hey, help me figure out
6 how to do this."

7 We know that we have to get there. We
8 haven't -- We haven't started on that road yet.

9 CO-CHAIR GIBSON: Okay. Mike . . .

10 MEMBER CHARTIER: I think your initial
11 intuition about targeting a small internal-type
12 approach is the right one. Here's kind of two
13 scenarios, and Dennis touched on this. There's
14 one where you have a well meaning single entity
15 that wants to get at the truth, and then you have
16 kind of that adversarial scenario, which most
17 sharing studies end up being.

18 You know, when you get into that
19 situation, every line on the linked budget, you
20 know, is debated. With what you're talking about
21 here, there are many, many other knobs -- right?
22 -- that will be debated. And so in all due
23 respect to my neighbor here, I'd kind of
24 cautioning against going to the ITU, because 12
25 years ago, or maybe more than that, I chaired a --

1 the group drafting the first report on Salzburg
2 defined radio, and we got enormous pushback on
3 that and opposition from operators and
4 manufacturers alike.

5 And the problem was, they didn't want
6 anything out there that would give regulators an
7 excuse for not finding them more exclusive
8 spectrum. So bringing any type of methodology in
9 there, there will be someone among the myriad of
10 different services that will see this as a threat,
11 and so you'll get enormous opposition to it just
12 because it's a threat.

13 So focussing on some internal
14 application where it could really add value is
15 probably right where you go.

16 MR. DE VRIES: Yeah. And just to put a
17 footnote to that, in a world where the incumbents
18 are well defined and never cease being an
19 incumbent, and the new entrants are always new
20 entrants and never incumbents, we will make no
21 progress. But one of the things that is
22 interesting about the time we're in now is it's
23 becoming more flexible, so that you find people
24 who are on different sides of the argument
25 depending on the proceeding.

1 And I know that there are regulators
2 who get really frustrated when the arguments that
3 are used by a particular party change depending on
4 which side of the argument they're on.

5 MR. DOMBROWSKY: Hark.

6 MR. DE VRIES: I know that's a shock to
7 everybody, yeah. I'm actually paraphrasing
8 somebody. But -- Yeah. So, you know, I think
9 that that's -- that's definitely going to be a
10 factor here and, you know, consistently is the
11 hard goblin of the small mind. So it's not going
12 to be cured overnight.

13 However, the bottom line for me is what
14 we're trying to develop is a method that people
15 can use. And, you know, like any method, you can
16 argue about the assumptions. If you can agree
17 about the method, then you've made some progress.

18 CO-CHAIR GIBSON: All right. Tom has
19 the last question.

20 Pierre, you'll be around for a while
21 after the meeting, so -- Go ahead, Tom.

22 MEMBER DOMBROWSKY: It's not a
23 question. It's just an observation. I just want
24 to build on what I just heard here. I agree to
25 keep it small is the right place. I also wanted

1 to echo the homogeneous point that Dennis raised,
2 but one thing to remember is in the cellular
3 context, it isn't one entity that's managing this.
4 It's multiple entities managing that.

5 So when you look at the border areas,
6 I'm using the A Block and he's using A Block next,
7 I'm managing that from a risk benefit analysis
8 every day. It's usually one guy calling another
9 guy -- a little bit more complicated than that --
10 but generally it's -- you know who the carrier is
11 and there's some discussions that go along.

12 MR. DE VRIES: Is it a conscious risk
13 assessment or an intuitive one?

14 MEMBER DOMBROWSKY: It think it's
15 conscious -- completely conscious and really
16 determined by how the rules came about in
17 cellular, where you each had to -- Otherwise, we
18 would have had gaps in coverage at the border
19 areas the way the rules were written, so it forced
20 these guys to actually reach an agreement.

21 MR. DE VRIES: Is it qualitative
22 conscious or quantitative conscious?

23 MEMBER DOMBROWKSY: I would argue it's
24 both -- absolutely both. So I think if you want
25 to talk to people, I think you talk to folks that

1 have negotiated and worked that. That would give
2 you a case study that's actually in the real
3 world, and you work off of that.

4 MR. DE VRIES: Yeah. Yeah.

5 CO-CHAIR GIBSON: Okay. Great. Two
6 questions, just -- This was your presentation
7 this morning, so was there a paper that was
8 associated with this as well?

9 MR. DE VRIES: Yes. So in the handout,
10 there is a link to the TAC paper. If you wanted,
11 it's bittly/tacriskinfo, one word. TAC is T-A-C,
12 and then "riskinfo" lower case.

13 CO-CHAIR GIBSON: And he'll hang around
14 in case anyone wants some more on the topic.
15 That's it.

16 Closing remarks, I think, is where we
17 are. I've not got a whole lot more to say.
18 Thanks everybody for coming out for a very
19 spirited discussion.

20 Our next meeting, I think, is tentative
21 for August 26th back home. There's a lot more
22 work to do. I'm impressed and amazed by the
23 amount of work that's been done. I saw all the
24 e-mails coming from the meetings you-all had for
25 the -- for your meeting, Charla and Michael, and

1 so it's a lot going on.

2 Did you have something?

3 MS. ATKINS: Yeah. So just to clarify
4 for the folks particularly on the phone, for the
5 June 4th meeting, it is being facilitated by CTIA
6 and CCA, but it's for the AWS-3 winning bidders
7 specifically. So it's not, you know, an open
8 meeting, per se. It's for the winning bidders.

9 Thank you.

10 CO-CHAIR GIBSON: With that, we're
11 adjourned. Thanks.

12 (Whereupon, the above-entitled matter
13 concluded at 4:30 p.m.)

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