

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL TELECOMMUNICATIONS AND INFORMATION
ADMINISTRATION

COMMERCE SPECTRUM MANAGEMENT ADVISORY COMMITTEE
(CSMAC) MEETING

Via Microsoft Teams
Friday December 9, 2022

1 PARTICIPANTS:

2 Co-Chairs:

3 CHARLA RATH
Independent Consultant

4 JENNIFER MANNER
5 Senior Vice President of Regulatory Affairs
EchoStar Corporation

6 Attendees:

7
8 JENNIFER ALVAREZ

9 REZA AREFI

10 DONNA BETHEA-MURPHY

11 HILARY CAIN

12 MICHAEL CALABRESE

13 THOMAS DOMBROWSKY, JR.

14 H. MARK GIBSON

15 DALE N. HATFIELD

16 CAROLYN KAHN

17 PAUL MARGIE

18 JENNIFER MCCARTHY

19 KARL NEBBIA

20 LOUIS PERAETZ

21 DANIELLE PIÑERES

22 GLENN REYNOLDS

1 PARTICIPANTS (CONT'D) :

2 DENNIS A. ROBERSON

3 ANDREW ROY

4 JESSE RUSSELL

5 STEVE SHARKEY

6 MARIAM SOROND

7 RIKIN THAKKER

8 BRYAN N. TRAMONT

9 JENNIFER WARREN

10 ROBERT WELLER

11 PATRICK WELSH

12 DAVID WRIGHT

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1 P R O C E E D I N G S

2 (10:01 a.m.)

3 MR. COOPER: All right. Good morning,
4 everyone. I have a couple of minutes after 10
5 o'clock, So, why don't we get going here? I'm
6 Charles Cooper. I'm the Office of Spectrum
7 Management here with an NTIA. Have a great
8 meeting lined up and appreciate everyone that can
9 join us, including out there in the public. There
10 is the agenda that is posted on our website and is
11 available. So, why don't we get started and let
12 me hand it off to Scott Harris, who's a senior
13 spectrum advisor here in the NTIA for some welcome
14 and opening remarks. Over to you, Scott.

15 MR. HARRIS: Thank you, Coop. Well,
16 good morning and welcome. So, I can't tell you all
17 how happy I am to be here with you. You know,
18 actually, I can. I've wanted to be a CSMAC member
19 for years, but I was never invited. So, early
20 this year, I said, the hell with it. And I
21 nominated myself Derek quickly responded and told
22 me I'd missed the deadline. So, I thought to

1 myself, you know, there must be another way to get
2 into these meetings. And then I had an idea. Not
3 sure it was my best idea. In any case I'm really
4 happy to be here with you, and we're all eager to
5 hear about the work you all have been doing. But
6 I thought I'd begin if you didn't mind, by telling
7 you a little bit about what we're doing and what
8 we're planning to do. First, as I'm sure everyone
9 knows, we are looking to craft a National Spectrum
10 Strategy in the coming year. We hope that one
11 output of this strategy will be a promising list
12 of bands to be studied in depth for additional
13 private sector use. But we hope there will be
14 other outputs as well. Perhaps there will be
15 additional thoughts on improvements in the
16 spectrum governance process. Perhaps there will
17 be ideas about new technologies to improve
18 spectrum sharing. But in any case, we're going to
19 begin the process by widely seeking public
20 comment. And I am hoping and guessing that most
21 of the ideas will come from outside of our
22 building. And of course, we hope to hear from

1 those of you participating in this meeting today.
2 I should also, say, as an aside, we intend for
3 CSMAC to maintain its role in our spectrum policy
4 development and that the current questions on
5 which you all are working remain critical to our
6 thinking. In addition, as you might guess, we
7 have been actively working on the evolution of
8 intelligent transportation systems in the 5.9
9 gigahertz band, which is important to the
10 Department of Transportation and to the expansion
11 of C-v2x technology. We think this is an
12 important technology for public safety, and we've
13 been working closely with DOT and the Commission
14 to make sure this spectrum remains viable for this
15 purpose well into the future. We also, continue
16 to work with our colleagues at the FAA and our
17 friends in the wireless community to permit the
18 continued rollout of 5G networks in C-band, while
19 absolutely ensuring aviation safety. And in case
20 you are wondering, are these discussions are going
21 well and the process now in place, in my view, is
22 working well. As you know, there are lots of

1 other spectrum issues on our plate. I don't want
2 to be talking about them all morning, because what
3 we're really interested in is to talk about what
4 you guys have been doing. And so with that, can I
5 turn it over to Jennifer and Charla and let them
6 take the helm?

7 CO-CHAIR MANNER: Thanks Scott, and I'm
8 very glad you finally made it to CSMAC, even
9 though in that convoluted sort of way. But more
10 importantly, I want to say welcome to NTIA, and I
11 know I can speak to the entire CSMAC when I can
12 say how happy we are to have you back in the
13 government and our ability to work with you. So
14 once again, Something and we very much look
15 forward to working on the national spectrum
16 strategy, Something I'm sure all of us think is
17 critically important. My second, I want to
18 welcome everyone to our last meeting of 2022 for
19 the CSMAC, our pre-holiday meeting. And I'm
20 wanted to say, well, it's great to welcome
21 everyone here virtually. I am hopeful that at our
22 next meeting perhaps will be there, we'll be able

1 to meet in person. I see Scott agrees. And
2 Charles and others. So that's my goal. More
3 importantly, I'm really looking forward to hearing
4 the reports of our working groups on the progress
5 they're making on the critical work of this
6 committee. And we have, I think, a sufficient
7 amount of time to work through that. I have to
8 say I'm personally in awe of the amount of time
9 folks have been putting into this, you know, with
10 weekly and biweekly meetings held regularly. And
11 I know there's a lot of work behind the scenes,
12 too. So, on behalf of Charlotte myself, I do want
13 to say thank you and I want to turn the floor over
14 to Charla next please.

15 CO-CHAIR RATH: Great. Thank you.
16 Thank you all. And thank you for being here
17 today. I have to say, I am literally going to
18 echo Jennifer's thoughts because I had the same
19 thing written down is that I am in awe of the
20 group of people that you have selected this
21 session for CSMAC, both new and returning members
22 have been incredibly actively involved. And it's

1 been a lot of fun and it's also, been interesting
2 to hear different people's views. And I think I
3 think we are in for a fun 2023 too. So, thank you.
4 Thank you for those comments. So now over to roll
5 call. And you know, I can see who is on, but I
6 actually am going to ask people to say yes if you
7 are here. So, starting with, Jennifer Alvarez.
8 Reza?

9 MR. AREFI: Yes.

10 CO-CHAIR RATH: Donna Bethea-Murphy.

11 MS. BETHEA-MURPHY: Yes, present.

12 CO-CHAIR RATH: Hillary Cain.

13 MS. CAIN: Yes.

14 CO-CHAIR RATH: Michael Calabrese.

15 MR. CALABRESE: I'm here.

16 CO-CHAIR RATH: Tom Dombrowsky.

17 MR. DOMBROWSKY: Here.

18 CO-CHAIR RATH: Mark GIBSON.

19 MR. GIBSON: I'm here.

20 CO-CHAIR RATH: Dale Hatfield.

21 MR. HATFEILD: Here.

22 CO-CHAIR RATH: Carolyn Kahn.

1 MS. KAHN: Yes, here.

2 CO-CHAIR RATH: Jennifer Manner. I know
3 you're here. Paul Margie. Oh, I think you're
4 here, but I'll get back to you. Jennifer
5 McCarthy.

6 MS. MCCARTHY: Yes, here. And thank
7 you.

8 CO-CHAIR RATH: Karl Nebbia.

9 MR. NEBBIA: Present.

10 CO-CHAIR RATH: Louie Peraetz.

11 MS. PERAETZ: Here. Thanks.

12 CO-CHAIR RATH: Danielle Pineres.

13 MS. PINERES: Present.

14 CO-CHAIR RATH: Glenn Reynolds.

15 MR. REYNOLDS: Present.

16 CO-CHAIR RATH: Dennis Roberson.

17 MR. ROBERSON: Here.

18 CO-CHAIR RATH: Andy Roy.

19 MR. ROY: Yes. Good morning.

20 CO-CHAIR RATH: Jesse Russell. Steve
21 Sharkey.

22 MS. SHARKEY: Here.

1 CO-CHAIR RATH: Mariam SOROND.

2 MS. SOROND: Hi, I'm here.

3 CO-CHAIR RATH: Rikin Thakker.

4 MR. THAKKER: Good morning, here.

5 CO-CHAIR RATH: Bryan Tramont.

6 MR. TRAMONT: I am here and happy
7 birthday, Charla.

8 CO-CHAIR RATH: Bryan thank you.
9 Jennifer Warren.

10 MS. WARREN: On by phone for the moment.
11 Thank you.

12 CO-CHAIR RATH: Bob Weller.

13 MR. WELLER: Good morning. Bob Weller
14 is here.

15 CO-CHAIR RATH: Patrick Welsh.

16 MR. WELSH: I'm here. I'm sorry.

17 CO-CHAIR RATH: Great. Dave Wright?

18 MR. WRIGHT: Yes, here.

19 CO-CHAIR RATH: And just sort of quickly
20 double checking. Jennifer Alvarez?

21 MR. COOPER: Jennifer I think may show
22 up late.

1 CO-CHAIR RATH: Okay, great. Thank you.

2 Paul Margie?

3 MR. MARGIE: I'm here.

4 CO-CHAIR RATH: Great. And Jesse
5 Russell? All right. You all. And -- you've been
6 muted to unmute yourself, Press *6.

7 MR. COOPER: Thank you, Charla. And
8 thank you to everyone for all the opening remarks.
9 And of course, welcome to Scott Harris as your
10 leadership. The NTIA front office is already
11 having an impact as we explore the policies and
12 all the procedures that we used to coordinate with
13 not only our sister agencies but also, with the
14 FCC. So, turning to some CSMAC business, we are
15 having today some preliminary reports from the
16 subcommittees, and I know they'll get to those
17 presentations in just a few moments. I do want to
18 mention a couple of developments which take the
19 form of clarifications of some of the questions.

20 First of all, the subcommittee on Ultra
21 Wideband waiver requests has been very strong and
22 in fact, gathering and analysis. And we're

1 looking forward to providing the interim report
2 this morning from the Ultra-Wideband folks. The
3 Subcommittee on Electromagnetic Compatibility
4 Improvements has sought some clarification on what
5 NTA would like to see from its work. As a result,
6 it now plans to focus on how to improve
7 compatibility analysis between airborne radar and
8 commercial wireless systems in the 5 to 16
9 gigahertz frequency range. Along similar lines,
10 NTA has clarified the scope of the work on the 6G
11 subcommittee, indicating that it should focus on
12 6G services only, but should look at how those
13 services could benefit federal users and the
14 federal government generally. And then we're
15 ready to start on question number four.

16 If you recall, we were going to have a
17 staggered start to question number four. It was
18 initially going to look at reviewing the Spectrum
19 Relocation Fund or the SRF, as we call it, But
20 with all the recent interest in CBRS in the 3.45
21 to 3.7 gigahertz range, and with the flexibility
22 that CSMAC offers, we're changing the question to

1 look at CBRS. Now specifically, and this is pretty
2 important, we're asking CSMAC to look into the
3 technical aspects of our sharing model in
4 protecting federal incumbents. It's not meant to
5 be an exhaustive review of CBRS, just a narrow
6 assessment of CBRS as there were just a few
7 remaining months left in the CSMAC term. And all
8 these volunteer members have other jobs that pay
9 the bill. We appreciate the flexibility of the
10 CSMAC leadership to accommodate this change. So
11 CSMAC has gotten off to a great start and as all
12 the subcommittee reports were revealed and the
13 clarifications of the scope and direction of the
14 work are helpful and not uncommon in this process.

15 Powers and continues to be ready to
16 provide our technical assistance and support of
17 the subcommittees as requested. Getting into the
18 meat of the interviews and data gathering work,
19 it's in the spirit of kind of good data in and
20 good data out. So, we want to make sure everyone
21 has a sharp vision of the information that will be
22 most helpful to us while being respectful to all

1 the volunteers' valuable time. And now back to
2 the co-chairs.

3 CO-CHAIR RATH: Great. Thank you,
4 Charles. Just quickly, does anyone on the CSMAC
5 have any questions for Charles about this? Okay.
6 I'm going to move on then. And what we're
7 starting now is, of course, the subcommittee
8 reports and as Charles said, the very first one up
9 is lessons learned from CBRS and federal
10 non-federal spectrum sharing. And as Charles
11 said, and the subcommittee hadn't yet started its
12 work, which gave NTIA the opportunity to pivot and
13 asked us to, in fact, look at this new topic.

14 And luckily, given that we're moving
15 forward rather quickly on this, our subcommittee
16 chairs, Mariam Sorond and Patrick Welsh, actually
17 agreed to stay on and lead the group. But because
18 it's a new topic, what we are doing is we're going
19 to start out fresh with members of the
20 subcommittee. So, I think some of you have already
21 told Antonio you want to join the subcommittee,
22 but if you haven't already and you want to, please

1 let Antonio know as soon as possible if you want
2 to join the subcommittee so Patrick and Mariam can
3 get started quickly in the New Year. With that,
4 I'm turning it over to Patrick, who will give you
5 obviously not an update on what the subcommittee
6 has been doing since it has not been doing that
7 much yet, but to let us know what the plans are
8 moving forward. Thanks.

9 MR. WELSH: Thanks Charla. So, we will
10 nimbly pivot and now we'll get some lessons
11 learned from CBRS both some positive and negative
12 lessons learned about the general and specific,
13 you know, framework that we've been operating
14 under now for about two years. We'll also, look
15 at how could commercial and federal sharing and
16 CVS be improved? Certainly, from that technical
17 aspect as well as what from the CVS spectrum
18 sharing experience should be considered for
19 implementation in other bands in cases. And then
20 finally, what from CVS spectrum sharing experience
21 should be avoided in other bands of cases? So,
22 those are the broad four questions that we'll be

1 looking at. Mariam, do you have anything else to
2 add? As we get ready to pivot on to this
3 question.

4 MS. SOROND: No, I just -- it was it
5 would as actually Charles mentioned, this is a
6 snapshot in time for CBRS as it's evolving and
7 growing. So, the subcommittee work would be
8 looking at that snapshot in time.

9 CO-CHAIR RATH: Great. Thank you.
10 Thank you both. I just also, want to ask if any
11 of the CSMAC members have questions for Patrick or
12 Miriam? Please let me know.

13 MR. CALABRESE: Yes. Michael.

14 CO-CHAIR RATH: Okay. Thanks, Michael.

15 MR. CALABRESE: Yes.

16 CO-CHAIR RATH: And actually, I should
17 have said that. Please raise your hand.

18 MR. CALABRESE: Ah, I see it. All right
19 but I'll --

20 CO-CHAIR RATH: You can go. Since your
21 voice is the first heard. Go ahead. Go ahead,
22 Michael.

1 MR. CALABRESE: Yes, Michael Calabrese.
2 Yes, just and this may go back to Charles. I
3 didn't realize we were, you know, done talking
4 about what this was about is. So, when you --
5 Charles, when you said narrowly, you mean narrowly
6 focus on how well or not CBRS is co-existing with
7 the US Navy and other incumbents? Or do you mean
8 other things beyond that?

9 MR. COOPER: Yes, Michael and good
10 morning. Hope you're doing well. Yes, so it's
11 the first part, right? So, there are only a few
12 months left in CSMAC term. So, we don't intend
13 this to be kind of a soup to nuts, if you will.
14 Aspect and evaluation of CBRS is looking on how
15 the sharing is going right between the federal and
16 non-federal users. And I like how Mariam phrase
17 is kind of like a snapshot in time right how's,
18 you know, it's been rolled out now for a few years
19 so you know I think with all the recent interest
20 in CBRS, it just seems like it's wise to see what
21 see what CSMAC thinks about this.

22 MR. CALABRESE: Okay, thanks.

1 CO-CHAIR RATH: Great. Thanks. Mark
2 Gibson, you are up next.

3 MR. GIBSON: Okay. Thanks, Michael.
4 That's one of my questions. I guess my other
5 question is, when do we start and how long are we
6 working on this? I can't remember when our term
7 sunsets.

8 CO-CHAIR RATH: Actually, I can answer
9 part of that question and then I'll turn it over
10 to the subcommittee co- chairs, because I think
11 they can answer the first part. The term ends
12 early January, so our intention is to have a
13 meeting in December.

14 MR. GIBSON: Okay.

15 CO-CHAIR RATH: So Sorry, Mark. You can
16 you can actually express your dislike of that
17 freely if you want to right now or you can --

18 MR. GIBSON: I thought I was on mute.
19 Sorry.

20 CO-CHAIR RATH: That's okay. But so as
21 Charles said, it's actually was very brief period
22 of time. So, I'll turn it over to Mariam and

1 Patrick to address the first part of the question.

2 MS. SOROND: And we're going to have to
3 jump into this. So, what I encourage everyone to
4 do, and I'm seeing emails coming in is to sign up
5 for the subcommittee because the original question
6 had different subcommittee members. And then as
7 soon as Patrick and I received that list, we will
8 schedule the first call as possible it is if we're
9 going to get and we're getting to the holidays,
10 we'll see if we can try it December, get together
11 with the subcommittee, but it may end in January.

12 CO-CHAIR RATH: Yes, I was going to say.

13 MR. GIBSON: So, one more time --

14 CO-CHAIR RATH: Yes, it actually -- you
15 were saying a December 2022 start if possible,
16 right Mariam?

17 MS. SOROND: Yes. So, December 2022
18 start. But again, let's see how that comes in,
19 how schedules align, because when Patrick and I
20 were discussing, we were assuming we're actually
21 starting the first meeting in January. But
22 Charla, I'm just I heard from you that you want a

1 conclusion in January, so which means that we want
2 to speed things up. I guess so let us process
3 that.

4 CO-CHAIR RATH: Yes, let me turn that
5 question really over to Charles and Antonio,
6 because that is my understanding is that this
7 session, it's not so much what I want, it's that
8 the session itself ends in early January of 2024.
9 So in order to get the report, you know, in this
10 session, I think it would have to be in December.
11 But Charles or Antonio, I know Antonio is on the
12 phone, so don't know whether you can address that
13 question.

14 MR. COOPER: You know, from the from the
15 timing aspect, I think it's been consistent with
16 the previous terms not to kind of run it up to the
17 actual deadline of the expiration of the charter.
18 So I would say, you know, having a few weeks of
19 room on the back end would be helpful.

20 MS. SOROND: So, this is a January, then
21 just -- I mean, what date is what date does the
22 term end officially? What is the deadline?

1 MR. RICHARDSON: Okay. Can you guys
2 hear me?

3 MR. COOPER: Yeah, we can hear you,
4 Antonio.

5 MR. RICHARDSON: Okay. Good. Huh. So
6 the term actually is January 6th, 2024, here. So
7 preferably that's why we're trying to get
8 everything by December time frame.

9 MR. GIBSON: So, you mean next December
10 23?

11 MR. RICHARDSON: Yes. No, actually,
12 next week there, Mark. Yeah. Thanks to Antonio.

13 CO-CHAIR RATH: Yes. No. And I and
14 that's I knew it was early January 2024. That's
15 why I was saying next December 2023.

16 MS. SOROND: I see. Okay.

17 CO-CHAIR RATH: Are you actually -- I'm
18 Sorry Mariam were you thinking you needed a report
19 this week?

20 MS. SOROND: That's what I --

21 CO-CHAIR RATH: Yes. No. I was
22 wondering about the look on your face. I'm like,

1 it's severe. That should be good. You know, I
2 was trying to be careful with dates we hear, and
3 I'm Sorry if I slipped, but. No, it's January
4 2024 is when the term ends. So next December.

5 MS. SOROND: Okay, great.

6 CO-CHAIR RATH: Glad we cleared that up.
7 I was sort of surprised that you were as surprised
8 as you were, but I'm Sorry.

9 MR. GIBSON: That's why I expressed the
10 grunt there. So, if we do have some time, so
11 that's great.

12 MS. SOROND: That is great. So, with
13 that, then, you know, we will have our first
14 meeting in January of 2023.

15 CO-CHAIR RATH: Good.

16 MS. SOROND: Thank you.

17 MR. GIBSON: Thank you.

18 CO-CHAIR RATH: Great. Thanks. And,
19 Dave, I see that your hand is up. So, Dave Wright?

20 MR. WRIGHT: Yes. Thanks, Charla. And I
21 think the questions I have largely been answered
22 because I was going to ask also, I'll start, and

1 I'll just observe on the scope. I've been
2 encouraged to hear Charles comments, Patrick and
3 Mariam's about, you know, how we're going to scope
4 this, because even with 12 months, you know, it's
5 going to be frankly a little challenging to do
6 justice to the topic. I think the good news is
7 there's a fair amount of work that's been done in
8 this area around, you know, the effectiveness of
9 the commercial and federal sharing mechanisms in
10 CBRS. And I think we can leverage that. But you
11 know, given how hot the topic, gauging the success
12 of the strictly commercial aspects of CBRS is, I'm
13 glad that we're not going to be looking at that
14 here. So, thank you.

15 CO-CHAIR RATH: Great. Thanks. And I
16 see that Karl Nebbia also, raised his hand and has
17 a comment or question.

18 MR. NEBBIA: Yes, I hope if we're
19 looking at this aspect of sharing with the federal
20 government that aspect of it, that if it's
21 possible for somebody from the NTIA staff to
22 participate in the group with specific knowledge

1 of whether there have been any interference
2 complaints by the federal government or
3 difficulties in getting the sharing information
4 required to feed the other processes. So, if we
5 come to the first meeting and nobody has any
6 information regarding complaints or hiccups in
7 that process, I'm not sure what we'll be talking
8 about because that would be evidence that the
9 process is working great, I guess. So anyway,
10 that would just be a help, I think to the process.

11 CO-CHAIR RATH: Yes. I was going to
12 say, Derek, I see you've got your hand raised too.

13 MR. COOPER: Go ahead. Yes, probably
14 Derek and I were going to we're going to maybe say
15 similar things, but certainly, you know, Office of
16 Spectrum Management will staff accordingly the
17 subcommittees like we have for the others and
18 anticipated this and Karl Yep already hear about
19 some of the information that's coming from the
20 committee so appreciate the heads up there. And
21 Derek do you have any --

22 MR. KHLOPIN: No, I was going to pretty

1 much say the same thing. Another thing and we
2 haven't talked to them, but good could be to maybe
3 set up even an interview with DOD, with a
4 subcommittee or Something that could be that could
5 be an angle there as well. But it's a good point.
6 I think we do want to be helpful.

7 CO-CHAIR RATH: Great. Thank you. I
8 don't see any other hands raised. so that's the
9 sum of the questions now for the CBRS subcommittee
10 group. But actually, that last question led me
11 directly to say something I meant to say earlier,
12 which was again, to thank NTIA for the liaisons
13 that are participating in each of the
14 subcommittees. They have been, as you even
15 mentioned, Charles, in your early in your early
16 comments, by mentioning how much back and forth
17 there has been, that back and forth has been
18 facilitated by the NTIA Liaisons and they've been
19 terrific. So, thank you to that group of people.
20 Now I'm going to turn it over to Carolyn Kahn for
21 a discussion of the work of the 6G subcommittee.
22 Carolyn?

1 MS. KAHN: All right, thank you so much.
2 Good morning. Reza and I are pleased to share an
3 update on our CSMAC 6G subcommittee. As you know,
4 it's our first full season of meetings since our
5 subcommittee kicked off our work. And so, we'll
6 be presenting initial highlights based on our work
7 to date. Here's a list of our subcommittee
8 members, and we want to thank all of you guys for
9 contributing to this work. We've had insightful,
10 good discussions and appreciate the diverse
11 perspectives and the expert input that all of you
12 have been providing.

13 So thank you and echoing what Charla has
14 said. We also, want to thank our Liaisons', a
15 special thanks to Richard Orsulak, or NTIA liaison,
16 as well as Antonio Richardson, our designated
17 federal officer. As also, said earlier, our
18 subcommittee has had some questions to clarify our
19 scope. And Kay (phonetic) has been very
20 responsive. So, thank you so much. I also, would
21 like to welcome Jennifer -- Jessica Quinley
22 (phonetic), our FCC liaison, to help facilitate

1 collaboration between NTIA and FCC. This slide
2 shows the wording of our study question as well as
3 subsequent clarification that NTIA provided.

4 So our question essentially has two
5 parts. The first part is focused on 6G use cases
6 and how federal agencies can benefit broadly from
7 6G. We're considering traditional wireless
8 communications, but also, use cases beyond
9 traditional wireless to include safety sensor,
10 radar space and other scientific applications.
11 And then the second part of our question is
12 focused on Spectrum Band to support 6G.
13 Specifically looking at the terahertz bands as
14 well as other bands that could support 6G and the
15 potential impact to government users. We're also,
16 asked to look at recommendations to help prepare
17 for this and other recommendations as well.

18 And so our subcommittee work has been
19 scoped to address these questions. So, this is
20 showing our schedule. We kicked off our work in
21 August and we have held six 6G subcommittee
22 meetings since. These have been focused on

1 scoping and planning our work, developing our
2 approach. We gathered key reference documents
3 that will be leveraging, developing a report
4 outline. We've developed a list of interview
5 questions so that we can kick start that effort
6 and also, discussed initial contributions from
7 subcommittee members going forward. So, our draft
8 paper and recommendations will be delivered in the
9 August, September timeframe and then our final
10 paper and recommendations following up on that in
11 December 2023.

12 For our interview plan, we will be
13 conducting interviews broadly, so it will be focus
14 will be focused on federal agencies as well as
15 industry, including service providers, equipment
16 manufacturers, academia and other non- profit
17 organizations such as standards organizations.
18 Our interview questions focus, first, we ask what
19 the organization's own involvement is with 6G
20 development, and then we go right into asking
21 about youth cases, traditional and then
22 non-traditional use cases, new and emerging and

1 unlicensed use cases. And then we specifically
2 ask about expectations for if and how federal
3 agencies and users can benefit from those use
4 cases. And we ask about international differences
5 in considerations in addition to national
6 considerations.

7 We then go into a set of questions on
8 spectrum asking about potential impact in use of
9 spectrum in mid-band focusing on 5 to 16
10 gigahertz, as well as the terahertz band focusing
11 on over above 95 gigahertz for that range. Then
12 we are asking about open and virtual networks and
13 potential impact to government users and, as
14 mentioned, international considerations. Our
15 subcommittee offers a draft vision for 6G. This
16 is dynamic connectivity across public and private,
17 digital and physical domains that enables
18 intelligent communications and creates conditions
19 for economic growth, enhanced national security
20 and societal well-being. So, this is a draft. We
21 will be continuing to iterate on that. If I chose
22 our draft report outline at a high level.

1 So we'll be providing introductory and
2 background information, leveraging and building
3 off of the good work that other organizations have
4 been doing in 6G. We then focus on 6G use cases,
5 potential use of 6G by federal government users,
6 potential spectrum bands to support 6G, Potential
7 implications to government users and will be
8 providing recommendations to help prepare for this
9 as well as overall recommendations. So now I'd
10 like to pass it over to Reza to talk about 6G
11 usage scenarios.

12 MR. AREFI: Thank you, Carolyn, and good
13 morning, everyone. I hope you can hear me. All
14 right. We have looked in the subcommittee and
15 looked at the work that ITU has undertaken to
16 develop a timeline and major elements for what
17 they call INT 2030. They have agreed on the
18 timeline such that the specifications would be
19 finalized at the end of the year 2030 and they
20 have also, agreed on various elements of that in
21 that process. Right now, they are in developing
22 their vision for this INT 2030 and a major part of

1 that vision is the categorization of usage
2 scenarios and how, what kind of how various
3 applications are categorized under various usage
4 scenarios.

5 And then at the next step, the next two
6 or three years, they will be looking at how these
7 user scenarios are characterized and what are the,
8 the major performance indicators and how they
9 would be evaluated and then later on compare it
10 against the specifications that will be submitted
11 sometime during 2027 and 2028. So it's a long
12 process, but they have the major elements and
13 milestones included. The importance of this
14 process in the ITU is that all major stakeholders
15 are participating. So the process is informed by
16 and also, you know, contributions and
17 participation by industry, by governments, by
18 various research organizations in different parts
19 of the world, in North America, in Europe and Asia
20 that are working on development of 6G.

21 So because of all those reasons and
22 important to take a look at this and have this in

1 mind on the top right, you see the famous
2 triangle, the 5G famous triangle with the three --
3 the three corners then have more the broadband and
4 the massive IOT, and then the ultra-reliable low
5 latency communications and all the applications
6 that a few years ago when this was developed in
7 ITU for 5G were envisioned fall under within this
8 triangle, fall under one or more (inaudible). The
9 same kind of approach is being taken now. The
10 evolution of those three (inaudible) are being
11 considered, albeit with different names, immersive
12 communications, massive communication and extreme
13 communications. But they are also, thinking of
14 for 6G, there'll be new usage scenarios that kind
15 of combine the communication aspects with
16 non-communication techniques, with technologies
17 such as AI or distributed computing or various
18 sensing and positioning applications. Right? So
19 there will be a figure similar to the triangle.
20 Maybe this time it's a hexagon that that has not
21 been decided yet. Maybe in February or in June,
22 they're supposed to finish this vision in vision

1 document in June. Going to the next slide, in
2 addition with the subcommittee has discussed
3 additional considerations that are important to
4 consider within this body of work.

5 How first, how 5G advancement and
6 evolution is going to impact the development and
7 evolution of 6G. As you know, there's
8 standardization happens in increments and how the
9 legacy 5G will impact the formation of and
10 development of 6G is something to consider.
11 Whether by directional or any kind of sharing for
12 that matter can be made to become intrinsic
13 within the within the specifications that would be
14 important connection with other working groups and
15 close collaboration is important. Now we need to
16 add that the CBRS has also, here. If anything,
17 the some of the spectrum bands that you saw in the
18 slide that Carolyn mentioned that are being
19 considered also, are shared with the scope of
20 other subcommittees.

21 So, it's important to have close
22 collaboration with the other subcommittees. And

1 also, how other connectivity technologies within
2 the ecosystem, how they all impact each other as
3 part of part of 6G, how they would be
4 collaborating or working for -- all of that needs
5 to be considered and also, how last but not least,
6 how development of the 6G use cases would be used
7 would be taken advantage of by federal government
8 and by other users. Next slide. Initial
9 observations, the timeline, as I mentioned
10 briefly, is of course driven by a lot of, a lot of
11 factors. Industry, government CEOs, they all have
12 they're all working on, on their own vision and
13 their own timeline.

14 As I mentioned, all of that is being fed
15 into the ITU. And at the end of the day, because
16 of the process, the importance of the final output
17 of the ITU, kind of everything funnels into that
18 into that process. Of course, at this point at
19 least, there is no definition of 6G. Maybe we
20 didn't have a definition of 5G or 14, so that
21 becomes less and less important as the technology
22 develops. And by the year 2030, whatever is being

1 produced in terms of standards, that would be what
2 6G will be.

3 But basically, there is a need for
4 characterization of 6G and the fact that at least
5 at the moment, there is no unified approach in
6 various regions in the world on what 6G would be
7 doing is a concern, but maybe it's because it's
8 just too early in the process. Another
9 observation is that spectrum technical,
10 interoperable standards, economies of scale, all
11 that, they all have international implications.
12 And it's important to have a close look at these
13 and consider them in our work. And it was also,
14 observed that early engagement from federal
15 agencies in shaping the use cases. For instance,
16 if there are applications that are important for
17 government to make sure that the use cases are
18 being defined in various research or developments
19 or within the ITU include or support those kinds
20 of applications, that would be important.

21 Next slide, please. Next steps and some
22 of it we already covered. So, we will conduct

1 interviews between December and June, the draft
2 report. We're planning to have it ready by
3 August, September timeframe, as we were
4 instructed. In the meantime, we will provide
5 regular updates and also, that the reports will
6 include recommendations at the end and also, the
7 final paper, December 2023. I think this was the
8 last slide. Do you have any questions for
9 Carolyn? Thank you.

10 CO-CHAIR RATH: I don't see any raised
11 hands. So, I'm going to assume no questions. So
12 over to you, Jennifer, for the next two reports.

13 CO-CHAIR MANNER: Thank you, Charla.
14 And thank you to all the working groups have
15 presented. Our next presentation is going to be
16 the electromagnetic compatibility improvements
17 with Tom and Donna, and I'm not sure who's going
18 first, so I turn over to you.

19 MR. DOMBROWSKY: Thanks. I'm sharing
20 the screen. I just make sure everybody can see
21 it.

22 CO-CHAIR MANNER: We can.

1 MR. DOMBROWSKY: Okay, great. I did not
2 coordinate very well ahead of time, so I will
3 admit that we'll play it by the seat of our pants
4 here in terms of who's doing what on these slides,
5 but I'll at least kick it off. First off, we have
6 the questions that were presented to us by NTIA.
7 As Charles mentioned at front, we went through a
8 series of clarification discussions. And so,
9 these questions have been slightly modified,
10 really just sort of focus the scope a little bit
11 more. So really trying to focus on how we can
12 increase the efficient use of the spectrum
13 resource by looking at radar and other systems
14 that are coexisting in co channel and non-channel
15 relationships.

16 How NTIA could use statistical based
17 analysis techniques for modeling to characterize
18 operational impact to federal systems when
19 improvements propagation modeling would increase
20 the accuracy. And what role NTIA should play in
21 ensuring the independent and timely analysis of
22 these potential interference scenarios. And then

1 the last catch all was other improvements
2 suggested by the CSMAC. This is our group. We
3 have had a very active group. I'll let Donna talk
4 to the next slide in terms of what we've been
5 doing here. But Dorothy Murphy and I or the
6 co-chairs. Antonio has been the liaison, although
7 I'll say Nicholas. And although Nick, if you are
8 officially our liaison or not. But Nick has been
9 at every meeting and very helpful to the group at
10 that while the subcommittee members, we've had
11 very active participation and we really appreciate
12 it. So, I'm going to let Donna talk to the next
13 one, which is sort of the status of what we've
14 been up to. If I can hand it over to you.

15 MS. BETHEA-MURPHY: Sure. And to echo
16 what Tom has been saying, we were very fortunate
17 to get volunteers, expert volunteers for each of
18 the section or we ran after people. And I have to
19 say, of all the CSMAC meetings that I've been to,
20 oftentimes you get a report out from experts, a
21 lot of things from NTIA, and it's a one-way
22 delivery. But I've been impressed at the dialogue

1 and the willingness of people to exchange ideas.
2 So thank you very much. I think that everything
3 is better when the discussion moves to ways.
4 We've had four meetings thus far. Again, we've had
5 a series of clarifications with NTIA, and thanks
6 for all of your patience. And as I discussed
7 before, we have volunteers for each of the
8 section. We've got IPS come in and give an
9 overview of efforts on propagation modeling and
10 NTIA most recently came in to give the background
11 on incumbent informing capabilities. We plan to
12 reach out to other federal agencies and look
13 forward to progressing the work in the New Year.

14 MR. DOMBROWSKY: And I'll just add on in
15 terms of our rapport at this point, we probably
16 have about 10 to 12 pages drafted, so it's getting
17 pretty fulsome. We've gotten very good
18 contributions from folks. We're hoping in the
19 next January meeting to really dig into that and
20 really have an open discussion about that. I
21 also, want to note that the IAC discussion,
22 because we peppered them so hard with questions,

1 they got through one or two of their slides and
2 probably had 30 more to go through. So, I have a
3 feeling we were going to reengage with them to
4 talk a little bit more about AIC and Carolyn Kahn
5 and Andrew Roy have drafted some interview
6 questions for this outreach to federal agencies
7 and other parties, and we're looking forward to in
8 the New Year getting more of those questions and
9 crystallizing those and beginning Some of that
10 interview process to sort of review three things.
11 And we thought it would be helpful to sort of walk
12 through what we learned in the meeting. And Bob
13 Wheeler and Reza, who put this together, I may
14 call on you at Some point if the questions get too
15 hard from the subcommittee, but at a bottom line,
16 we have a very good meeting with ITS.

17 They are looking very actively at
18 propagation models and how it should work, really
19 pointing out that the fact that the existing
20 models really require expert users who understand
21 the constraints and limitations to get about. You
22 can't just look at a propagation model and

1 immediately know what you're looking at unless you
2 really have studied it very clearly, carefully.
3 And then radio science, as it applies to real
4 world problems, is not deterministic. We really
5 have to take into account probabilistic
6 uncertainties. As you look at models and focusing
7 on a narrowly defined cases are less likely to
8 have those uncertainties. There's another lesson
9 that it's sort of passed on through to us and data
10 driven modeling and complex environments such as
11 (inaudible) is an area of needed study and it has
12 got some funding to sort of look into that.

13 And for those of you that have been
14 paying attention, I see Mark Gibson here. I know
15 when forum has got its speaking as their session
16 next week and from what I can tell anybody and
17 everybody can sign up. So, if you're interested in
18 this area, show up and you can get a lot more
19 detail and information on that. And then finally
20 for this slide, the sensitivity interpretation of
21 those input datasets such as our terrain
22 measurements, et cetera, that is another area of

1 needed study. So, it's sort of suggested that, you
2 know, we really need to develop or they need to
3 develop or Somebody needs to develop an expert
4 system or handbook that helps tell folks use this
5 model for this kind of situation and use this
6 dataset for this situation, but really sort of
7 give the recipe for how to use the propagation
8 modeling.

9 They are starting to look at open-source
10 measurement databanks that you think that could
11 help validate Some of these models. Propagation
12 model use cases requirements should be chosen from
13 possible deployments. So, really trying to focus
14 in on how to make these models as best as possible
15 and really getting Some experimental design that's
16 repeatable and documented is critical to make
17 these predictive models be more tuned and making
18 sure there's enough time and funding and good
19 science and engineering behind it to really inform
20 the spectrum policy decisions is critical. And
21 then finally, a systematic approach should be
22 taken to standardize these models, especially in

1 the highest priority frequency bands. ITS say
2 they've got a five-year grant to look at the sort
3 of lower three gigahertz band, and they expect to
4 do measurements and really fine tuning models for
5 that.

6 And we're -- they're hopeful I think
7 that that will help inform propagation model
8 perfection. For lack of a better word, since
9 nothing's ever perfect over time. So, we found
10 that to be really helpful and useful, and I think
11 we'll continue to engage with them over the next
12 year as we reach some conclusions. But that was
13 sort of a nutshell of what we learned in the
14 propagation model discussion with ICS. And
15 frankly, that's sort of our report at this point
16 and really open it up to questions from the CSMAC.
17 I don't know. Donna has anything else to add as
18 well?

19 MS. BETHEA-MURPHY: That's it. Thanks.

20 CO-CHAIR MANNER: Okay. Well, thank you
21 both. And thank you to the committee. You've
22 been doing great work and I'm very happy to see

1 the question narrowed. And I think this is an
2 incredibly important area. So, your work is
3 certainly critical with that. Are there any
4 questions? I don't see any hands raised but want
5 to give a second. But with no hands raised, then
6 I will go on to our last committee report, but
7 certainly not least important, the Ultra-Wideband
8 subcommittee, and I'll turn it over to Paul and
9 Dennis to present, please.

10 Back to you. Okay.

11 MR. MARGIE: Yes, I am here, Dennis.
12 Are you going to start us off? All right. I
13 guess I will do it if Dennis may be having
14 connectivity problems. So, I'm Paul Margie,
15 Dennis Roberson and I were the co-chairs of the
16 Ultra-Wideband subcommittee. We were given the
17 job of reporting first and trying to get to
18 conclusions as early as possible. So, we want to
19 thank everybody who was on the subcommittee for
20 all the many meetings and front loading this work.
21 So much so thank you to everybody for doing that.
22 And I'm not sure who's driving these slides, but

1 next slide, please.

2 CO-CHAIR MANNER: And also, whoever's
3 driving them, can we put them in kind of visual
4 and slideshow format? That would be great just to
5 make it easier. Thank you.

6 MR. MARGIE: All right. Next slide,
7 please. All right. So, number one, this slide
8 shows what NTIA asked of us. And the issue here
9 is that we're seeing a lot of growth in the Ultra
10 Wideband market, and it's used in location
11 services, distance measurements. Oh, we lost it.

12 CO-CHAIR MANNER: Yeah, I think I saw
13 where Dennis actually was controlling the slide.
14 So I wonder if he -- as you said, Paul, he may be
15 having some connectivity problems. Is there some
16 way you can --

17 MR. MARGIE: Why don't I take over? I
18 will see if I can do that. Okay. Can people see
19 my slides?

20 CO-CHAIR MANNER: Yeah, I can. Okay.

21 MR. MARGIE: All right. Let's do that.

22 MR. ROBERSON: Yeah. I'm not sure

1 what's happening here. Teams is not behaving well
2 for me at all.

3 MR. MARGIE: All right, well. Okay,
4 Dennis?

5 MR. ROBERSON: Yes. It put me on hold.
6 Which was a very weird place. Maybe we should
7 return to -- you got control of the screen, which
8 is what somehow went awry for me. Our plan was
9 that I would provide the overview, and then Paul
10 will carry on with the meet, if you will. So, let
11 me pick up with our previous plan, and my
12 apologies for whatever happened with Teams. It
13 was very, very badly misbehaving for me. In any
14 event, this is the overview of the questions that
15 we were provided. The key question for us, it
16 relates to the AWB growth in number of requests
17 and the impact on NTIA, on delivering the
18 perspective on those request s as they are passed
19 on from the FCC. And in particular, there is a
20 concern that with the slow growth in the number of
21 waivers that they are effectively providing
22 changes to the base AWB rules. So, are you all

1 able to hear me? First of all, given the earlier
2 challenges?

3 MR. MARGIE: Yeah, you're good.

4 MR. ROBERSON: Okay, good. So, let's
5 move on to the next slide. These are the specific
6 questions, but rather than go into all the
7 details, the real question is how can we make
8 things better in the UWB space, particularly for
9 NTIA to improve the efficiency and to inspect the
10 potential for change that would make things better
11 from a process standpoint and from the rules
12 themselves. Late breaking news and literally late
13 breaking news. Antonio forwarded a note from the
14 FCC that he received yesterday that said that the
15 FCC is now considering potential changes to the
16 UWB rules, which was quite a surprise to us
17 because the assumption going in was that the FCC
18 would not be entertaining changes, but that now
19 apparently based on the late breaking news, is no
20 longer the case. So that will somewhat alter our
21 focus as a subcommittee as we move forward. So
22 move on to the next slide, please. So, this is the

1 Dream team. My opening comments were to introduce
2 the subcommittee, a.k.a. the Dream Team, and this
3 is the Dream team. And I say that not just
4 lately. This has been a spectacular group
5 focusing on the topic. Very highly engaged. And
6 it was mentioned in earlier comment that when the
7 speakers come before us, it's a very much a
8 two-way street with the equal time being levied by
9 the subcommittee members with the very
10 well-informed questions that they have brought to
11 the table. And so that's been a terrific thing.
12 And then I would also like to highlight on the
13 right-hand side of the chart, the enormous support
14 from NTIA itself. Ed and April and Antonio have
15 been at all the meetings as far as I can remember,
16 and Charla has taken the role from the co-chair
17 standpoint to be, I believe, all the meetings as
18 well. And Jessica, we appreciate you being there,
19 and I think facilitating the late breaking news
20 that we received. So, a strong team moving forward
21 on this next slide. We are the go getters of the
22 group. We've had 12 meetings thus far, including

1 the 6 subject matter experts. And I'm really
2 remiss in not adding a seventh subject matter
3 expert. And this is a thank you to Dale Hatfield.
4 We had Stacey Weber do a piece of work to analyze
5 the FCC's waiver requests, and we'll get to that
6 shortly. But she really --

7 MR. MARGIE: Hold on there Dennis.

8 MR. ROBERSON: Oh, there she is. Yeah,
9 there she is.

10 MR. MARGIE: And I just want to second
11 that Stacey is a federal law clerk right now that
12 that Dale sent our way. She did a lot a lot of
13 analysis for us and in her free time. And so,
14 thank you, Stacey, for all that great work.

15 MR. ROBERSON: Now, that's terrific.
16 Okay, onward. The next piece really was the
17 genesis of the work from Stacey and Ed and Gisella
18 and April Lundy, and it was pulled together by Tom
19 Dombrowski. So, this is -- gives you a landscape
20 of the waiver petitions and give you the
21 background for the work that follows that. So
22 next slide. So, the basic data, it's not an

1 enormous number of waivers, as you'll see at a big
2 peak in 2019, and then it comes back down. But
3 there is an upward trend in the number of
4 petitions that have come forward and the
5 complexity of them is increasing as well. So, it's
6 another dimension on the chart, if you will, that
7 adds to the challenge. But this is the basic
8 data.

9 Next chart, Next slide. The areas
10 investigating what is the nature of the waiver
11 requests. And they really have come in these five
12 areas. And if we see the rules listing and this
13 is a very nice piece of work to examine exactly
14 where the challenges are and just to hit on a
15 couple of them. Originally, for those of you who
16 have been involved with UWW and I know it's
17 several members of the CSMAC organization were
18 directly involved were at the FCC at the time or
19 are involved in other ways.

20 But the notion was that this would be
21 UWB pulses if you will and that has changed.
22 There are different waveforms that are being used

1 there. The approach to the limits, power limits
2 and the like have been part of this. And
3 generally, these are the areas in any event that
4 have been focused. Next slide. Probably the
5 biggest news in UWB is that today UWB is not your
6 grandmother or grandfather's UWB. The usages that
7 were anticipated when the rules were originally
8 derived was that this would be largely a
9 competitor to higher performance, competitor to
10 Wi-Fi or that sort of communications link. And
11 current applications are anything but.

12 And you can see three categories of UWB
13 usages that in all cases don't look at all like
14 communications products, but the use of UWB for
15 sensing, particularly if you go to the consumer
16 products for door locks and vehicle locks and the
17 like. Are there the medical uses again using the
18 sensing capability, the wide bandwidth and then in
19 construction, civil engineering kinds of areas.
20 But these are the emerging areas and I'll sort of
21 jump ahead a bit and we'll touch on this as Paul
22 takes over. But the Europeans have really taken

1 advantage of UWB even to a greater degree than the
2 US has and, in these areas, as well. Next slide.

3 The trends, the general trends. You've
4 seen, the number of waivers per year slowly
5 increasing the pressure for rule amendments is
6 growing. The subject matter experts who presented
7 to us pointed out that there was significant
8 desire to not have waivers, but rather to see
9 generic changes to the rules. And that apparently
10 now is afoot. The FCC itself does look at waivers
11 to see if they are related to previous waivers.
12 And this has been one of the concerns that NTIA
13 has, that you end up with de facto changes to
14 rules by virtue of, well, this waiver looks a lot
15 like that waiver therefore will pass this waiver.
16 And as that continues, then you effectively do get
17 a de facto rule change as the waivers come in.

18 Each of the waivers receive some level
19 of opposition, not huge opposition in most cases,
20 but virtually all of the waivers have that
21 additional factor built into the process. As
22 we've seen from the use cases earlier, IOT and

1 consumer devices is really where the action is
2 with WB, not in the communications area. And then
3 the final observation at the COP level is that
4 most of the waivers have some geographic
5 limitation or some limitation on the number of
6 devices that would be involved. Those that don't
7 have that characteristic become very difficult.
8 If it's a carte blanche request, then there's
9 great hesitancy to pass the waiver.

10 So that gives you sort of the lay of the
11 land as we observed it. And now I'll transition
12 over to Paul and dig more deeply into our findings
13 and how we're moving forward with this. Paul,
14 take it away.

15 MR. MARGIE: All right. So, now comes
16 the part of the program where we make
17 recommendations. And so, in order to do that, we
18 want to give a little bit of background on how we
19 got there. And then we tried to be as practical
20 as we could in things that NTIA could do and
21 expanded that a little bit to some others. So
22 number one is several of us on the subcommittee

1 back in the Paleolithic era were actually there
2 doing some of these initial rules, and you're
3 going to be shocked, you know, Scott Harris
4 especially will be shocked to learn that we did
5 not get everything right, like when we had
6 assumptions about where the technology was going
7 to go. Amazing that a bunch of lawyers didn't
8 predict where things were going to go in the
9 future.

10 And that's what kind of happened here.
11 So there's been a lot of real change in Ultra
12 Wideband in the use cases. So, as you heard from
13 Dennis, I think there was an assumption that there
14 was going to be Wi-Fi like service here for Ultra
15 Wideband plus the wall and ground penetrating
16 radars. And what we're seeing is the wall in
17 ground penetrating radars are a real market and
18 they're really going, and they are important. But
19 what maybe the FCC order didn't see coming was
20 this idea of precision location. And that's where
21 we're seeing a lot of the innovation here is in
22 precision location. So, while the players have

1 changed, the technology has changed, the
2 applications have changed, the FCC rules have not
3 changed. And what does that lead to?

4 Waivers. And I think everybody knows
5 that making changes by waivers over a multi-decade
6 period is not anyone's ideal use of government
7 resources. But that's where we are right now.
8 And so, these waiver requests we hear from NTIA
9 create substantial administrative challenges at
10 NTIA. They also create challenges for the
11 applicants. Applicants want predictability. They
12 want to know that the investments that they're
13 making in innovation are going to have a stable
14 treatment that's hard in a waiver context. So, and
15 this is also happening against a background where
16 Ultra Wideband technology growth is actually
17 happening. I think back when this originally
18 happened, we saw that this was -- we thought this
19 was going to move forward a little more quickly
20 than it did. But we're now at the numbers that I
21 think the FCC thought they would be at for Ultra
22 Wideband.

1 And in Europe, we're seeing even greater
2 numbers. They have a very different regulatory
3 system. And with that allows some different
4 things than us, especially the automotive industry
5 in Europe has pushed forward aggressively in Ultra
6 Wideband. So, what does that mean? We saw through
7 a series of really great interviews and
8 presentations views from both the Ultra Wideband
9 community itself and from NTIA, so Ultra Wideband.
10 So companies that are making these requests find
11 the waiver process opaque and complex as waivers
12 can be. This is especially hard for start-up
13 companies, and those are exactly the kind of
14 companies that we want to incentivize to make the
15 investments to make the next generation of these
16 technologies. So, these waiver applicants see
17 delays. They have challenges with confidentiality
18 when they've got brand new technologies that
19 they're trying to get out there. They're not
20 enthusiastic about putting details in waiver
21 requests or in follow-up information requests.
22 They would prefer an FCC rulemaking where they've

1 got rules in place that look at the current
2 technologies, but they're operating in a waiver
3 context.

4 At the same time, we've got experience
5 from NTIA that the information in the waivers that
6 they're getting is often insufficient to do the
7 job that NTIA must do, which is to ensure that any
8 waiver protects important government uses. And
9 so, the Ultra Wideband waivers that we're seeing
10 are more complex than we've seen in the past. And
11 we'll explain a little bit about that on the next
12 slide. But also here, an Ultra Wideband and this
13 is really important. Unlike a lot of other waiver
14 requests, the scope is really different. You've
15 got Ultra Wideband hitting more agencies and more
16 bands than other types of waiver requests where
17 NTIA is asked to coordinate. So, staff then have
18 to go out and talk to more different agencies in
19 more different bands, and those agencies are asked
20 for their input. This numbers game makes it
21 particularly hard for NTIA to get it done. And
22 there's time pressure, often NTIA is informed on

1 which waivers are actually moving pretty late in
2 the process and we think these are all things that
3 we might be able to improve.

4 So just a little bit of detail on one
5 thing I said earlier, which was why are the waiver
6 requests getting a little different over time?
7 One is the use of fixed infrastructure. So, we're
8 seeing perimeter identifiers, we're seeing things
9 in rail lines. Some of these fixed
10 infrastructures are temporary fixed or nomadic
11 fixed, but they're still fixed. We're seeing
12 outdoor like operations here. This is much more
13 pervasive in Europe, but even here, we're seeing
14 things like external building blocks where the
15 attenuation assumptions might be a little
16 different than indoor. We're seeing increased
17 power level requests in the waivers for both these
18 indoor operations and outdoor ones. And Dennis
19 talked about this, but we're seeing alternative
20 waveforms. Originally, we were thinking about
21 studies that were focused on impulse, but now
22 we're seeing requests on Swept, Stepped wave

1 forms, other things that make it a little more
2 complicated.

3 And as I said, ground penetrating, Ultra
4 Wideband is important and it's currently
5 restricted to government use. But we're seeing
6 requests for broader commercial use as well.
7 Okay. So that leads to three kinds of proposals.
8 One is things that NTIA itself can do. The second
9 is we have some recommendations for things that
10 the Ultra Wideband community can do so that when
11 things hit NTIA, we have set it up for success.
12 And then third is we think more generically there
13 are some work that can be done not in the context
14 of individual waivers, but in a generic context to
15 create some common goods, some common
16 understandings that will make the situation better
17 for NTIA and for the Ultra Wideband community.
18 All right. Word soup.

19 I totally violated here the rule about
20 having a number of words on the page or font, but
21 we wanted to get it all on one page. And I'll try
22 to simplify this a little bit, but here are a set

1 of recommendations for NTIA. And so, it's worth a
2 read because the words matter here. But here's
3 the big picture. Number one, we think NTIA-FCC
4 collaboration is important and NTIA and the FCC
5 have made a really big and important step with the
6 new MOU. We think the new MOU creates a vehicle
7 for coordination, specifically on Ultra Wideband.
8 So they're getting some kind of a preview listing
9 from FCC to the NTIA would be important. And this
10 is something I frankly just didn't understand
11 before this. And so, I learned a lot. It's not
12 just whether there's a waiver request, but it's
13 which ones are moving, right. That's really
14 important.

15 And I really from FCC world didn't see
16 the importance of that so that the NTIA can put
17 its resources in the right place. So, that's
18 number one that's important. Number two is and
19 the next few are related to each other. We
20 recommend that NTIA provide some guidance on the
21 federal use characteristics that Ultra Wideband
22 applicants should use in doing their analysis.

1 It's really hard for the applicant side to know
2 how to do technical work to ensure that government
3 users are protected. If you don't know what
4 government users are supposed to protect or what
5 they're doing, like what are they vulnerable to
6 and what are they not? And so, we think there's
7 some work there generically, without revealing
8 things that should not be revealed on federal use
9 characteristics that would make the situation
10 better for everybody. We think one specific thing
11 that could be done on the NTIA side is to take the
12 Spectrum compendium and increase it up to at least
13 ten gigahertz that we're seeing higher frequency
14 applications. And this probably is going to have
15 benefits outside of just Ultra Wideband, but we're
16 seeing use of higher technology, higher frequency
17 technologies, and we think that would really
18 assist from the outside for people being able to
19 give NTIA the types of waivers that you guys want
20 to see.

21 And then we also think that NTIA could
22 make publicly available for Ultra Wideband

1 developers and for the applicants the kinds of
2 Ultra Wideband techniques and levels that it's
3 comfortable with. The more people know, the more
4 likely they're going to be able to design their
5 applications so that they hit where you guys want
6 them to hit. And relatedly, there are we think
7 there's a way of identifying a set or a class of
8 applications that are more likely to receive fast
9 treatment and those that probably are going to
10 receive more intense scrutiny. And that's going
11 to help NTIA to be able to get the fast ones on a
12 fast track, so they don't eat up too many
13 resources, but also warn the applicants, hey
14 here's some things that if you do, they're going.
15 Be take a little bit more time and effort to do
16 that. But that upfront work of establishing those
17 two classes would really benefit, we think, both
18 NTIA and the Ultra Wideband community.

19 And last, we think, and this is Dale's
20 recommendation, we got to put a process in place
21 to track whether this is working because we might
22 need to shift over time to make sure that we do it

1 better. So, let's not just do something and then
2 just hope it works. Let's do something and
3 measure if it works. Next are our recommendations
4 for the Ultra Wideband community. So, this is a
5 partnership, right, to make sure that we've got
6 both sides working together for the outcome that
7 we want. Number one is to meet with NTIA early.
8 NTIA staff is great and helpful, and they can lead
9 you away from landmines that you might not know
10 were there. So, talk to people early if you're
11 going to make an application to the FCC, don't
12 just drop your FCC application in. Wait until
13 it's NTIA time and then and only then go to NTIA.
14 And then based on that discussion, get technical
15 reports going early in the process that are geared
16 to the kind of things that NTIA is going to ask
17 you and consider those things at NTIA tells you,
18 tells the community more generically that are
19 going to get on that fast lane versus that more
20 intense scrutiny lane.

21 And a general truth that we heard over
22 and over again is that if an applicant can

1 demonstrate that their request is going to produce
2 no greater impact than the kinds of systems that
3 are permitted under the existing rules, you're
4 probably going to get faster treatment. So, think
5 about that as a kind of a principle to guide you
6 on where you're going to go early in the process.
7 Last, we had some recommendations that are more
8 generic for work between the FCC and NTIA and the
9 Ultra Wideband community to create a foundation
10 for more success overall. So first is that we
11 think NTIA, and the Ultra Wideband community could
12 talk about what kinds of generic technical studies
13 industry could do to provide some common technical
14 platform for discussions going forward. Are there
15 certain things that come up over and over and over
16 again where we had some basic sets of studies that
17 everybody could refer to certain numbers.
18 Everybody could refer to certain metrics that we
19 would have a language that leads us to faster
20 action. So that's number one.

21 Number two is we think that NTIA and
22 Ultra Wideband should be having a conversation

1 about rule changes. There may be a discrete set
2 of rule changes that would knock a lot of these
3 applicants out so we wouldn't have to have
4 waivers. I think there's concern of having a
5 comprehensive rule change that puts everything
6 back on the table. Well, let's have that
7 conversation now and see if there's a discrete set
8 of things based on what we've learned from these
9 applications where there may be something for the
10 FCC to do here to change the dynamic. And then
11 lastly, and I mentioned this already, there's
12 great collaboration now between NTIA and the FCC.
13 Here's another vehicle for making sure enforcement
14 as part of that process, you know, we don't want
15 to just think about rules by establishing them and
16 then put them in a closet and forget about them.
17 And this is another Dale Hatfield nugget of
18 wisdom. We got to think about Ultra Wideband
19 enforcement from the beginning and think about how
20 that process is going to work. So, I know that's a
21 lot, but we did a lot of work in a short period of
22 time, so thank you to everybody to do it, and

1 we're happy to take any questions.

2 CO-CHAIR MANNER: Thank you so much,
3 Paul. And I think the recommendations, the work
4 is fantastic and it's great to see your interim
5 recommendations. Before I ask for questions, I
6 wanted to just turn it over to Antonio, who has a
7 brief clarification to make. Antonio, please.

8 MR. RICHARDSON: Yes, thank you,
9 Jennifer. I just wanted to make sure we
10 understand that a petition for rulemaking has been
11 filed at FCC, but the status of that at FCC is not
12 known. We're doing this UWB independent of any of
13 the FCC action. And I just wanted to make sure
14 that we were all on the same page with that and
15 that'd be it. Thank you.

16 CO-CHAIR MANNER: Okay thank you so much
17 for the clarification with that. I don't see any
18 hands up, but I certainly want to give folks a
19 moment to see if they have any questions.

20 MR. KHLOPIN: Hey Jennifer. Derek. I
21 think Jennifer has one, but she's trying to get
22 back in (inaudible) dropped and I just readmitted

1 her.

2 CO-CHAIR MANNER: Thank you. I missed
3 her hand, so thank you.

4 CO-CHAIR RATH: Yes. No, I was just
5 going to say the same thing. I saw a brief --

6 CO-CHAIR MANNER: Okay. I'll let
7 Jennifer in then -- Jennifer, please go ahead.

8 MS. WARREN: Sorry. Teams is not my
9 friend today either, as you all know. I think one
10 thing that's useful to just point out, I think,
11 you know, the team just made a great presentation
12 we can find ourselves right to looking at, as Paul
13 I think used the term the two sides federal
14 government and the UWB industry. Given the scope
15 of our committee and the question, we did not look
16 at the private sector interests impacted by the
17 UWB waivers either. So, I think we just want to
18 make sure that that's understood. We had a
19 discussion about that not being in our
20 jurisdiction. So that dimension of this question
21 is not being addressed in this group. Just so that
22 anybody listening outside of the subcommittee

1 doesn't think that the scope of the actual broader
2 question. Thank you.

3 MR. MARGIE: Yeah, let me just underline
4 that. That is exactly right. People should not
5 read into our not considering that to mean that
6 it's not important. It's really important. But
7 the subcommittee decided that our job here was
8 about the NTIA part of it and the government part,
9 but please don't read into it. Not being in there
10 and not being important. It's important.

11 CO-CHAIR MANNER: Thank you both for the
12 clarification and I don't see any hands. It's a
13 terrific job, Paul, a great presentation, as with
14 the orals.

15 MR. MARGIE: Karl's got a hand up.

16 CO-CHAIR MANNER: Oh, please, I swear
17 I'm not seeing hands. Please, Karl, go ahead.
18 Anthony, are you speaking too? Because I see you.

19 MR. RICHARDSON: No, I'm sorry.

20 CO-CHAIR MANNER: Okay. Karl, please go
21 ahead.

22 MR. NEBBIA: Yes, it's the one thing.

1 This is an interim report and one thing I'd like
2 just to ask. Maybe some thoughts by the chairs as
3 to activities that you see moving forward to bring
4 this to be a final report. Is it a matter of just
5 cleaning up what we've done and finalizing it, or
6 are there aspects of work that you still see need
7 to be done? And we've had some discussions in the
8 last couple of days about the aspect of
9 enforcement and how that might go forward and what
10 that might mean. So are there other areas that
11 we're going to be exploring as we bring this to a
12 final report as opposed to an interim?

13 MR. MARGIE: Dennis, do you want me to
14 take a crack at that?

15 MR. ROBERSON: Yes. I wasn't sure,
16 Karl, whether you were asking for Karl and I to
17 respond or Jennifer and Charla to respond?

18 CO-CHAIR MANNER: Yes.

19 MR. NEBBIA: No, I'm actually thinking
20 you and Paul, since you're guiding the --

21 MR. ROBERSON: Yes.

22 MR. NEBBIA: -- the document.

1 MR. ROBERSON: Okay, very good. With
2 that clarification, I think that that we do have
3 some clean-up. We've made a -- as you have all
4 seen, we've made a lot of progress. Kudos to the
5 dream team. There are some lingering issues.
6 There is the one that Antonio and I talked about,
7 the FCC really understanding what exactly they're
8 doing and what opportunities that provides. But I
9 think those will be the dimensions that we would
10 move forward with. Otherwise, we're, I think, the
11 group and certainly looking for feedback. I think
12 the group would find that we've moved it very long
13 way down the pike here, as was requested by the
14 chairs, because we are in -- we have been asked to
15 finish early even as the new CBRS will come later,
16 and we are on a path to do that. So, a long-winded
17 answer, but hopefully helpful.

18 MR. MARGIE: Yes, I agree with that. I
19 think we're mostly done. But Karl, as you said, I
20 think probably there deserves a little more
21 conversation about enforcement to see exactly what
22 we mean there. So, I would personally like just to

1 spend a little time thinking about that so that
2 our final has reflects are subcommittee
3 memberships thoughts on enforcement and so we make
4 it into a real recommendation there or decide what
5 the four corners of it are. But I think other
6 than that unless the full CSMAC has a negative
7 reaction to our recommendations, I think the core
8 of our recommendations will stay in place.

9 CO-CHAIR MANNER: Okay, perfect. Thank
10 you so much. I have Dave Wright next with a
11 question, please.

12 MR. WRIGHT: Yeah, thank you. Thanks,
13 Jennifer. It's more of a comment and my thanks
14 very much to the committee for their good work as
15 you are going through your recommendations,
16 particularly the final ones where you sort of have
17 the triangle of NTIA, the Commission and then
18 industry with some recommendations on how to
19 improve the, I would say the communication and the
20 processes there. It occurred to me that as we
21 talk about federal and non-federal sharing
22 becoming more prevalent in other bands, that a lot

1 of those recommendations could be generalized.
2 And so, I don't know if it's the scope of this
3 subcommittee, but I think somebody ought to be
4 looking at those recommendations and thinking, are
5 these general principles that can be applied more
6 broadly? You know, we've had a smattering of
7 waiver requests so far and the (inaudible) band
8 and I think we can certainly expect that going
9 forward and other federal commercial bands.

10 CO-CHAIR MANNER: And thank you Dave.
11 Charla, I believe your next place.

12 CO-CHAIR RATH: Yes, I just actually.
13 Just to echo what Dave just said, I think it's
14 sort of an interesting because sometimes that can
15 wind up being a recommendation of a subcommittee
16 for further work. So that would be good. The
17 other thing that Dennis and Paul, I would urge you
18 to do is give, you know now that the full
19 committee has seen this. You know, people might
20 want to take a little bit of time to look at it
21 and possibly get comments back. So, you might want
22 to give people, you know, a deadline, you know,

1 offline. In an email to the full CSMAC, just
2 saying, you know, because you all are at a
3 different point than the other three committees at
4 this point because you have very solid
5 recommendations. And presumably at the next
6 meeting you will be introducing a full draft of
7 these recommendations for the for the committee,
8 the full committee to vote on. So therefore, you
9 want to urge them to read and comment and give
10 feedback to you so that it's incorporated in
11 whatever you do next.

12 MR. MARGIE: Great. Charla, can I ask
13 just a process question on that? So, we do it
14 correctly?

15 CO-CHAIR RATH: Sure.

16 MR. MARGIE: So, as I understand it, what
17 we would do is then we have our whatever our final
18 discussions among the subcommittee are, we create
19 a stable final version of this, and then we would
20 seek via email kind of any input from all CSMAC
21 folks. Then we, based on that, create a final for
22 the next official public meeting.

1 CO-CHAIR RATH: Yes, I'm actually saying
2 something. It's somewhat similar, but a little
3 bit different. I'm suggesting that you give the
4 CSMAC members a deadline now for what you put
5 before them to give initial comments and then you
6 go through the same process with the next meeting,
7 you'll, you know, you will send out via Antonio.
8 Antonio will send out your draft a few days in
9 advance. The meeting will discuss it at the next
10 meeting. And then you'll also give some time for
11 feedback after that meeting to sort of finalize.
12 But you will also generally what happens is in the
13 meeting itself, people will comment on things that
14 they would like you to change. And often what we
15 will do is literally in the meeting be making
16 changes and then the last meeting you'll actually
17 get a vote. So, it's sort of -- and we can talk a
18 little bit more about that offline if it's not
19 clear. But that's the way we generally do it.
20 And, you know, Jennifer, I think you'd probably
21 agree that that is that works well. You were a
22 subcommittee chair the last time I've been a

1 subcommittee chair. And it just -- you know,
2 people need a little bit of time. They'll hear
3 the conversation at the meeting. But don't give
4 it too much time. You guys have got to get moving
5 on your work to get to your final place. So but
6 you know, the whole CSMAC, should be able to
7 comment within the next couple of weeks on what
8 they've seen today and what they've heard today.

9 CO-CHAIR MANNER: Understanding there's
10 holidays --

11 CO-CHAIR RATH: Understanding there's
12 holidays, yes, understanding their holidays. But,
13 you know, yes, I suppose people are taking time
14 off. You could probably say the first of the
15 year.

16 MR. ROBERSON: I was sort of thinking
17 the reverse. We'll get it sent out now and ask
18 for Friday one week from today. Obviously, we'll
19 take comments beyond that, but that will get it in
20 before everybody disappears for the final.

21 CO-CHAIR RATH: You guys, are in charge.
22 So you do what you think is the right way to do

1 it. But all I was trying to say is setting it up.
2 So you see, you'll get comments. Now put
3 something before the full CSMAC in another few
4 months right before the meeting, get comments
5 after -- during the meeting after that and put
6 together the final that will be voted on at the
7 meeting, not the next meeting, but the meeting
8 after that.

9 MR. ROBERSON: I was merely taking
10 advantage of the fact that the CSMAC is here and
11 assembled. So, consider next Friday unless we send
12 something different out in the email.

13 CO-CHAIR MANNER: Well, done, Dennis.
14 Well done. So, we'll expect -- Charla do you need
15 the floor? I see your hands.

16 CO-CHAIR RATH: No, I'm good. I'm good.
17 No, I'm --

18 CO-CHAIR MANNER: Perfect. So are there
19 any other comments or questions on Ultra Wideband.
20 Okay, say none. We're going to move on to the
21 next section of our agenda. Public comment. But
22 before I open the floor for that, and Antonio is

1 going to help me with that, I do have one notice,
2 is that we did receive a comment before the
3 meeting from Mr. Steve Jones and it has been
4 passed over to the Ultra Wideband Committee
5 subcommittee and they'll review it and address it
6 during the next CSMAC meeting. And of course, I
7 do want to thank Mr. Jones for his comment with
8 that. Are there any other comments that are
9 coming in, Antonio? But behind me if you're
10 talking.

11 MR. RICHARDSON: Okay. No. There is
12 nothing else. If you want to open it up to the
13 public now, I have unmuted them all in. So
14 therefore, if they are able to speak. If you're
15 ready for that.

16 CO-CHAIR MANNER: I am. Thank you. Is
17 anyone from the public have any comments? Just
18 give them a minute or so.

19 MR. RICHARDSON: Yes. Those on the
20 phone. If you have any comments for the CSMAC
21 members, this is your opportunity to make your
22 comments. Thank you. Make sure that we're not

1 having any technical difficulties. Mr. Rich,
2 Orsulak, are you able to hear me?
3 Okay. Do I have anyone out there on the phone
4 that would like to speak to me?

5 MR. HARRIS: Certainly not be a
6 technical problem, Antonio.

7 MR. RICHARDSON: No, I don't think it
8 is. But maybe they just don't like me.

9 MR. HARRIS: Okay. We like you.

10 CO-CHAIR MANNER: Yes, we like you on
11 the CSMAC.

12 MR. RICHARDSON: Thank you.

13 CO-CHAIR MANNER: So, Antonio, should we
14 assume that no one's raising comments and we
15 should go ahead and close the meeting?

16 MR. RICHARDSON: That would be
17 affirmative.

18 CO-CHAIR MANNER: Okay. Well, thank you
19 so much. So first, I want to thank our
20 subcommittees and all the CSMAC members for their
21 work to answer the questions that NTIA has given
22 us on critical spectrum issues. I'm really,

1 really pleased to see the progress we're making,
2 especially the Ultra Wideband subcommittee, who
3 had a very short period of time. And I know the
4 CBRS Committee has their work cut out as well as
5 to our other committees to address these critical
6 spectrum issues. In closing, I would like to
7 thank our CSMAC Subcommittee chairs are working
8 group members NTIA for their continued support as
9 well as the FCC and NTIA liaisons. And of course,
10 I'd be remiss if I didn't mention Antonio
11 Richardson, who of course we all like very much
12 and who we see as the heart and soul of CSMAC.

13 And with that, I want to wish you all a
14 very happy holiday season and a very happy New
15 Year. I look forward to working with all of you
16 in 2023. I have to remember what year is next
17 year, and I want to turn the floor over to my co-
18 chair, Charla Rath, for her closing remarks.

19 CO-CHAIR RATH: Great. Thank you,
20 Jennifer. And my closing remarks are much the
21 same as Jennifer's to thank everyone involved in
22 this process. You know, our subcommittee chairs,

1 liaison, NTIA Leadership, and of course Antonio
2 and my co-chair, Jennifer Manner, and all of which
3 all of whom have just really put their best foot,
4 you know, feet forward. I guess it's multiple, so
5 it's best feet forward. And really, we're moving
6 along a good track this year and we'll be able to
7 finish things up in 2023. Not this December.
8 Mariam, next December. And so, with that --

9 MR. HARRIS: I think Derek has a hand up
10 maybe.

11 CO-CHAIR RATH: Oh, Derek, you have a
12 hand up?

13 MR. KHLOPIN: I just wanted to -- yes, I
14 just wanted to real quickly before everyone hung
15 up. And I don't know if Scott or Charles is going
16 to say something. Just add again.

17 MR. HARRIS: Go ahead, Derek.

18 MR. KHLOPIN: Yes, you go ahead, Scott.
19 I just wanted to thank everybody for their work.
20 But Scott, I'll let you let you speak as well.

21 MR. HARRIS: So, what I want to do is
22 reemphasize how important you all are to NTIA,

1 right? I don't want to just thank you for your
2 hard work. I would also like to point out you are
3 really important to the work that we do, and we
4 couldn't do it without you. So, with that, I
5 wanted to wish you all a very happy holiday
6 season. And look at all the effort. I went to
7 get here to see you guys. Right.

8 CO-CHAIR RATH: Thank you.

9 CO-CHAIR MANNER: Thank you, Scott.

10 CO-CHAIR RATH: Yes. And on that nice
11 note. Thank you, Scott. We will adjourn. Thank
12 you all. Thank you, everybody. Happy holidays,
13 all of you.

14 (Whereupon, at 11:35 a.m., the
15 PROCEEDINGS were adjourned.)

16 * * * * *

17 I Charla Rath and Jennifer Manner do hereby certify this
18 transcript as Co-Chair of the Commerce Spectrum
19 Management Advisory Committee.

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21

22

1 CERTIFICATE OF NOTARY PUBLIC

2 COMMONWEALTH OF VIRGINIA

3 I, Mark Mahoney, notary public in and for
4 the Commonwealth of Virginia, do hereby certify
5 that the forgoing PROCEEDING was duly recorded and
6 thereafter reduced to print under my direction;
7 that the witnesses were sworn to tell the truth
8 under penalty of perjury; that said transcript is a
9 true record of the testimony given by witnesses;
10 that I am neither counsel for, related to, nor
11 employed by any of the parties to the action in
12 which this proceeding was called; and, furthermore,
13 that I am not a relative or employee of any
14 attorney or counsel employed by the parties hereto,
15 nor financially or otherwise interested in the
16 outcome of this action.

17

18 (Signature and Seal on File)

19 Notary Public, in and for the Commonwealth of
20 Virginia

21 My Commission Expires: August 31, 2025

22 Notary Public Number 122985

