

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,
Patent Owner.

IPR2023-00599
Patent 10,912,081 B2

Record of Oral Hearing
Held Virtually: August 7, 2024

Before JOHN D. HAMANN, SEAN P. O'HANLON, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

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The above-entitled matter came on for hearing on August 7, 2024,
commencing at 3:00 p.m., via video teleconference.

P R O C E E D I N G S

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JUDGE HAMANN: This is the hearing in IPR2023-00599, *Samsung Electronics Company, Limited and Samsung Electronics America, Inc. v. Apex Beam Technologies, LLC*. I'm Judge Hamann. Also on the panel are Judges O'Hanlon and Raevsky. I'd like to begin with introductions from the parties. Who is participating on behalf and attending on behalf of Petitioner?

MR. CERULLI: Hi, Your Honor. This is Nick Cerulli on behalf of Petitioner.

JUDGE HAMANN: And for Patent Owner, who is appearing for Patent Owner?

MR. PYMENTO: Your Honor, Julian Pymonto on behalf of Patent Owner. With me is lead counsel, Vincent Rubino.

MR. RUBINO: Good morning. And Mr. Pymonto will be presenting for Patent Owner.

JUDGE HAMANN: Thank you. Also, there's a public line for today's hearing, so to the extent there's members of the public participate calling in, we welcome those folks. I remind the parties that they should not raise any confidential information in light of that public line.

Obviously, this is a video hearing we're conducting today. I would request that when not presenting and not speaking, parties mute themselves, so there's no background noise. Also, endeavor when you go to speak to unmute yourself. That seems to be the bigger problem of the two.

We have the file, the papers, exhibits in front of us, available to us so to the extent you want to reference those, please do. But in your

1 presentation, whether referring to slides or whatnot, please refer to slide
2 number, exhibit number, page number, for example. That will allow us to
3 follow along better, as well as provide for more detail in the record for when
4 we are reviewing that. We can more readily understand what's being
5 referred to.

6 If for some reason you're disconnected or there's some degradation
7 that is causing problems, please, you can let us know right away and/or if
8 you're disconnected, follow up with the people that were identified for the
9 contact information setting up today's hearing.

10 Each side will have 60 minutes to present for total argument. We're
11 going to begin with Petitioner, as Petitioner bears the burden, followed by
12 Patent Owner's response, followed by any time reserved for rebuttal and
13 surrebuttal. I will endeavor to give a time warning towards the end of the
14 allotted of time, but the parties may find it helpful to the extent that they
15 want to track their own time for pacing purposes.

16 With that, we'll turn to Petitioner. And forgive me, is it Cerelli? I
17 didn't quite get it.

18 MR. CERULLI: It's Cerulli.

19 JUDGE HAMANN: Cerulli. Thank you. How much time would you
20 like to reserve, if any, Mr. Cerulli, for rebuttal?

21 MR. CERULLI: I'd like to reserve 15 minutes for rebuttal.

22 JUDGE HAMANN: Thank you. You may begin when you're ready.

23 MR. CERULLI: Okay. I'd like to start on slide 4 of Petitioner's
24 demonstratives. So, in this proceeding, there are two grounds, the *Lee*
25 ground and the *Chen* ground. Now, both *Chen* disclose the same beam
26 switching procedure that's claimed in the '081 patent. The main difference

1 between the grounds is Apex raises a dispute about what constitutes a radio
2 signal in *Lee*. Now, this argument's wrong for a number of reasons that we'll
3 get to, but even if it were accepted, this same argument does not apply to
4 *Chen*. And so the *Chen* ground is essentially a fallback for the *Lee* ground.

5 Now, unless the Board has any preferences, I plan to start with the
6 *Lee* ground and address any remaining issues in *Chen*. But first, I'd like to
7 turn to claim 1 of the '081 patent. So if we turn to slide 6, both parties agree
8 that figure 7 of the '081 patent is representative of claim 1. So I think it's
9 helpful to walk through next to the claim.

10 And as you can see, in figure 7, the UE receives a second radio
11 signal, which is shown in blue, followed by a first radio signal shown in
12 green. And now, in this figure, the boxes that we see represent symbols in
13 the time domain. And the ovals represent the receiving beam that is used to
14 receive each symbol. And so, as you can see, the symbols in the second
15 radio signal and the first part of the first radio signal are received using a
16 wide beam in this embodiment, and the symbols in the second part of the
17 first radio signal are received using a narrow beam. And this is because
18 there's a beam switch that occurs partway through receiving the first radio
19 signal. And that's at the first time point, which is shown in the slide in pink.

20 And consistent with the claim language, the symbols before the first
21 time point use a receiving beam related to the second radio signal, which in
22 this case is, in the embodiment in figure 7, is a wide beam. And the symbols
23 that come after the first time point use a different beam that is indicated by
24 the second radio signal and in the embodiment, in figure 7, a narrow beam.

25 Now, turning to slide 7, *Lee* discloses everything we just discussed,
26 like the '081 patent.

1 JUDGE HAMANN: Counsel, this is Judge Hamann. If I could,
2 looking at slide 6, Petitioner's slide 6, obviously you have figure 7 I believe
3 it is annotated as well as claim 1 here. I had some questions about claim 1
4 and some of the things that have been highlighted.

5 MR. CERULLI: Sure.

6 JUDGE HAMANN: For example, the claim has first time units. I'm
7 trying to get an understanding of some of the examples of what a first time
8 unit is in the spec. I think, for example, they say that can be a slot or that
9 could be a subframe, for example.

10 MR. CERULLI: That's right, Your Honor. I think the other example
11 that is included in the '081 patent is a time transmission interval. So it can
12 be any number of those, a slot, a TTI, time transmission interval, or a
13 subframe. And as we'll see in *Lee*, *Lee* also discloses a TTI that contains
14 both the second and first radio signal. And similarly, as we get to *Chen*, I
15 believe *Chen* discloses a slot. And unless I'm mistaken, there's no dispute
16 between the parties as whether the prior art teaches the claimed first time
17 unit.

18 JUDGE HAMANN: Well, you mentioned TTI. I recognize that the
19 '081 patent specification certainly identifies that, I think, for the first time
20 here. But then it doesn't make any other reference anywhere else in the
21 specification to the TTI, as I recall. Is that fair?

22 MR. CERULLI: I'd have to go check, Your Honor, whether TTI is
23 mentioned throughout or in just one example. But I will note that I believe it
24 states pretty clearly, and I can pull it up, that a first time unit can be, in one
25 embodiment, a TTI.

1 JUDGE HAMANN: Okay. And I guess behind a lot of this, a lot of
2 the terminology used in the specification appears to relate to LTE, although
3 LTE is mentioned in other technologies, but doesn't seem to necessarily limit
4 the terminology to LTE. So how should we view, you know, some of these
5 terms, be it TTI, slot, be it subframe, be it frame, you know, as it relates to
6 claims and as it relates to LTE, for example?

7 MR. CERULLI: Yeah, as you recognize, Your Honor, the '081 patent
8 doesn't limit it to LTE or 5G, for example. And so, you know, at least how
9 the '081 explains the first time unit it can be any number of things, including,
10 as we discussed, a TTI, a slot, a subframe. All of those would be sufficient
11 to meet the claimed time unit. And so, I guess to answer your question, we
12 shouldn't view it as strictly an LTE patent or a 5G patent. It certainly is
13 broad enough in its description to cover either of those standards.

14 JUDGE HAMANN: Thank you. So, look, you know, first time, I
15 think you said some of the examples the specification discloses are slot,
16 subframe, a TTI. I noticed what isn't highlighted here on slide 6 is time-
17 domain resource. What meaning has Petitioner given to time-domain
18 resource in the context of claim 1? And how does that relate, if at all, to the
19 first time unit or first time point, for example?

20 MR. CERULLI: Yes. So the '081 patent talked about there can be
21 multicarrier symbols that are included within time units. So if you have the
22 example where it's a slot, it is known that a slot is made up of multiple
23 symbols. I think in some examples it can be 14 symbols. And so, you
24 know, to answer your question, how the first hashing it relates to the time-
25 domain resources, a time-domain resource would be a resource in the time

1 domain or, in this case, it can be a multicarrier symbol in which there is
2 some information provided.

3 I hope that answers your question.

4 JUDGE HAMANN: I think that's helpful. Let me ask, you know, so,
5 for example, time-domain resource may just be a portion of the time domain
6 that relates to a particular symbol. Is that fair?

7 MR. CERULLI: That's accurate, Your Honor.

8 JUDGE HAMANN: Thank you.

9 MR. CERULLI: So, turning back to slide 7, *Lee* discloses everything
10 we just discussed in slide 6. Like the '081 patent, *Lee* disclosed a second
11 radio signal shown in blue and a first radio signal shown in green. And like
12 the '081 patent, *Lee* shows the first radio signal is broken up into two parts
13 with a beam switch that occurs partway through such that the first part is
14 received using a wide beam and the second part is received using a narrow
15 beam.

16 Now, if we turn to slide 8, I think it's helpful to see these -- view
17 these figures side by side. Now, one of the main disputes between the
18 parties is whether *Lee*'s control blocks 1203 and 1204 constitute the claimed
19 second radio signal, and whether *Lee*'s transport blocks, TB1 and TB2,
20 constitute the claimed first radio signal. Now, as you can see in figure 7 of
21 the '081 patent, both the second radio signal and the first radio signal are
22 made up of multiple parts, or in this case multiple symbols. You can see
23 there's a stream of symbols that make up the second radio signal and a
24 stream of symbols that make up the first radio signal.

25 Now, with respect to the first radio signal, you can see that there's
26 actually, because there's a beam switch that occurs in the middle of the first

1 radio signal, there are two blocks of symbols or two streams of symbols that
2 make up the first radio signal. And this is exactly what *Lee* did, as you can
3 see on the right side of the screen.

4 Turning to slide 12, there are two main disputes. The first one is
5 what I just discussed in relation to the first radio signal. And the second
6 issue relates to the limitation regarding the second radio signal being used to
7 determine a time-domain resource occupied by the G multicarrier symbols.
8 Both these arguments fail for the reasons we'll discuss, but I'll start with the
9 first argument related to the radio signal.

10 So in slide 14, Apex proposes construing radio signal as a signal that
11 transmits particular radio information. Now this construction was never
12 raised in District Court, but regardless, there's no support for this
13 construction. There's nothing in the intrinsic evidence that limits radio
14 signal in this manner. And even Apex's own extrinsic evidence shows why
15 the construction is wrong.

16 Turning first to the intrinsic evidence on slide 15, as the Board
17 recognized at Institution, radio signal is used broadly throughout the '081
18 patent. For example, as we can see on this slide in figure 7, and as we just
19 discussed, both the second and first radio signals are shown as a block of
20 multicarrier symbols and the first radio signal is even shown as being
21 comprised of two blocks of symbols received using two different beams.

22 Now, the specification language is similarly broad in its discussion
23 of a radio signal. As we can see on the right side of the screen, in one
24 embodiment, the '081 patent states that the first radio signal "is a consecutive
25 data transmission block in the time domain." In another embodiment, "the
26 first radio signal is G consecutive multicarrier symbols in the time domain."

1 And another example, the first -- sorry, "the second radio signal is a
2 PDCCH," or a physical downlink control channel,"and the first radio signal
3 is a PDSCH," or a physical downlink shared channel. And finally, the '081
4 patent states that the second radio signal can be "a DCI that is used for
5 indicating downlink assignment."

6 Now each of these examples --

7 JUDGE HAMANN: Counsel?

8 MR. CERULLI: Yes, sir.

9 JUDGE HAMANN: This is Judge Hamann again. I'm trying to
10 understand some of the terminology that you've listed here. It seems to be a
11 bit loose at times. And what I mean by that, for example, let's focus on the
12 middle portion that you cite here is column 2, lines 20 to 23. You know, the
13 first radio signal is -- actually let's start with the bottom block, column 18,
14 lines 19 to 24. You know, the second radio signal is a PDCCH, so that's the
15 physical downlink control channel. I think that's what that stands for.
16 Obviously, I don't believe a signal can be a channel, so -- unless I'm
17 mistaken. So what is your understanding of what's being conveyed here by
18 that statement, for example?

19 MR. CERULLI: Yeah, my understanding is consistent with yours that
20 it's a signal that's sent within a particular channel. So you have a PDCCH
21 which is one type of channel, and a PDSCH which is another channel. And
22 so the PDSCH is well known in the art for sending user data and the
23 PDCCH is well known for sending control information. So yes, my
24 understanding is similar to yours, Your Honor.

25 JUDGE HAMANN: They say well known. Again, that's sort of back
26 to -- it seems like we're using terminology all in LTE context. You know,

1 PDCCH is well known in LTE, for example, and some of the other
2 technologies. But, you know, it's not necessarily limited to that. So it seems
3 sort of an odd construct if so much of the specification is focused on LTE for
4 lack of better terminology. And yet -- and that seems how we're using it, but
5 it's not necessarily so limited.

6 MR. CERULLI: Yeah. Your Honor, the specification uses this,
7 again, as one example. I will note the other example simply defines a first
8 radio signal as G consecutive multicarrier symbols in the time domain. So,
9 you know, the specification provides a number of examples. And, you
10 know, certainly we don't think that the claims are restricted to just one of
11 those examples.

12 JUDGE HAMANN: Thank you.

13 MR. CERULLI: So I'll turn to -- next to slide 16. You can see from
14 Apex's own extrinsic evidence that its claim construction is flawed. As we
15 can see here, Apex cites to a definition for control signal as "a signal that
16 transmits control information." Now, if we were to apply that same logic,
17 Apex's construction should have been a signal that transmits radio
18 information. And you can see the word "particular" is added by Apex here.
19 And as I'm sure you can see from some of the briefing on this issue, this
20 word "particular" has created a lot of confusion over what is or isn't a radio
21 signal.

22 And so, you know, in this case, Apex is essentially trying to create
23 an arbitrary line drawing exercise to define something as a single radio
24 signal or two radio signals when it's convenient for them. And as Your
25 Honors know, the purpose of claim construction is to provide clarity to the

1 claims, but, unfortunately, Apex's construction only adds confusion. And
2 we can see that with some examples.

3 Turning to the next slide, slide 17. When asked at his deposition
4 what was meant by the term "particular radio information," Apex's expert
5 couldn't even explain what it was, stating that "it depends on the content. If
6 the content is changing, the information itself is changing," to provide any
7 clarity for the fact finder.

8 As we'll see on the next slide, Apex's own use of that interpretation
9 is inconsistent. So turning to slide 18 --

10 JUDGE HAMANN: Counsel? Mr. Cerulli, this is Judge Hamann
11 again, if we could go back to slide 16. And again, this is sort of where you
12 set forth Patent Owner's construction. A few questions. Obviously, what's
13 cited here is to the declaration of Patent Owner's, expert, Mr. Gomez's expert
14 declaration, which cites in turn a purported dictionary definition. But my
15 understanding is that dictionary definition isn't in evidence. So how should
16 we view that dictionary definition in light of the fact that, you know, an
17 expert can rely on hearsay to the extent it's appropriate to do so under
18 certain, you know, factors, yet we don't have the actual dictionary definition
19 in evidence.

20 MR. CERULLI: Yeah. Your Honor, that's a good question.
21 Certainly, as we mentioned in our briefing, we don't believe this has been
22 formally submitted as evidence and so the Board should ignore it. But, you
23 know, as I just kind of went through, even if you were to look at this
24 definition, it actually contradicts the construction and it doesn't support it.
25 So certainly, even if it was considered as evidence through -- you know, via

1 its own -- Apex's expert's citation to it, you know, we don't think it supports
2 the claim construction at all.

3 JUDGE HAMANN: Also, turning to their proposed -- Patent Owner's
4 proposed construction, in light of the fact I believe Petitioner says that even
5 in light of that proposed construction the art discloses the limitation. Let me
6 try to understand what meaning the Petitioner's put to some of this. For
7 example, you know, "signal that transmits," I recognize the definition listed
8 there, but in my view, you know, a signal may contain information or
9 convey information. I'm not sure "transmits," that may be too particular, but
10 I think, you know, being precise has importance, certainly. So what's your
11 view of "transmits" in this context?

12 MR. CERULLI: Your Honor, I think you are correct that depending
13 on the vantage point, if you're the UE or the base station, you'll either be
14 transmitting or receiving. I think certainly for claim 1 it's referring -- yeah, I
15 would tend to agree with Your Honor's instincts there that maybe what was
16 intended was a signal that includes radio information. Because as I just
17 noted, if you're the base station or UE, it's going to change if you're
18 transmitting or receiving that information.

19 JUDGE HAMANN: Okay. And I recognize on slide 16, for example,
20 and our discussion already about the word "particular," but it also -- the
21 construction ends in radio information. I'm trying to understand what
22 meaning Petitioner put forward to -- you know, what radio information is
23 when Petitioner argues that, even under Patent Owner's construction, *Lee*
24 discloses the limitation.

25 MR. CERULLI: Yeah, and I'll certainly get to the -- you know, our
26 interpretation of particular radio information. In this case, and if you don't

1 mind, Your Honor, I can skip ahead to one of the slides I have on this. It's
2 slide 22. There is an admission by Apex's expert that particular radio
3 information can include multiple pieces of information. And a particular
4 question was asked, "Is downlink control information particular
5 information?" And Apex's expert answered that yes, "it can be." And he
6 also later stated that a DCI can include both resource information and
7 modulation information, thereby admitting that particular radio information
8 can include multiple pieces of information.

9 And so the -- to answer kind of your original question, the
10 interpretation of that, we apply this interpretation where multiple pieces of
11 information can make up a particular radio information, as admitted by
12 Apex's expert.

13 JUDGE HAMANN: Then what aspect of that is radio information,
14 modulation information? Or is it broader context that you just described?

15 MR. CERULLI: Yeah, I think it's a bit broader than that, Your
16 Honor. You know, certainly there's communication between the UE and the
17 base station. There's no dispute that information being transmitted, whether
18 the control information or the unit, is radio information. And so, you know,
19 I don't think we provided a specific definition or interpretation of radio
20 information because it wasn't something that was in dispute between the
21 parties.

22 JUDGE HAMANN: Thank you.

23 MR. CERULLI: So, just turning back to slide -- turn to slide 18. So,
24 as I mentioned, Apex's construction is very vague. And Apex's expert uses
25 this interpretation differently depending on different contexts. As I just went
26 through on the right, Apex's expert seems to admit that it can include

1 multiple pieces of information with respect to a DCI. But then on the left
2 side of the screen, when discussing the prior art, Apex argues that -- seems
3 to argue that anytime there's different information, it must constitute a
4 different radio signal. But both of these can't be true. And so, you know,
5 there's certainly no clarity through Apex's construction, and it fails for that
6 reason.

7 And if we can turn to slide 23, as I noted to Your Honors, we applied
8 Apex's expert's interpretation of particular radio information as including
9 multiple pieces of information. And using that interpretation, *Lee* discloses
10 both the second and first radio signal. So if we look at *Lee*'s figure 12, *Lee*
11 discloses two control blocks that together form a signal that transmits
12 particular radio information. And just like the '081 patent, *Lee*'s control
13 blocks are consecutive transmission blocks and includes symbols,
14 consecutive symbols in the time domain.

15 Now, in turning to the first radio signal on slide 24, *Lee* discloses --
16 also discloses the first radio signal under Apex's construction. And that is,
17 *Lee* discloses two transport blocks that together form a signal that transmits
18 particular radio information. Now, also, like the '081 patent, *Lee*'s transport
19 blocks are consecutive transmission blocks, or symbols, in the time domain.
20 And also, like the '081 patent, *Lee* discloses that there's a beam switch that
21 occurs in the middle of transport block 1 and transport block 2, such that the
22 first radio signal in *Lee* is received in two parts.

23 Now, unless there are other questions on the radio signal dispute, I'd
24 like to move to the symbols limitation dispute, starting on slide 27. Now, in
25 this argument, Apex argues that the claimed second radio signal is used for
26 determining a time-domain resource occupied by the G multicarrier symbols

1 should be construed as the second radio signal is used for determining a
2 time-domain resource occupied by each of the G multicarrier symbols.
3 Now, as the emphasis shows, Apex is simply trying to add words to the
4 claim. The words "each of" don't appear in the claim and they certainly
5 don't appear anywhere in the specification. And in this case, the claim
6 language is otherwise unambiguous. And so, as the Federal Circuit has
7 repeatedly found, adding words to the claims, having no support from
8 specification or prosecution history, and when it is otherwise unambiguous
9 claim language, it could be rejected.

10 Turning to slide 28, if we look at the intrinsic evidence, nowhere
11 does the '081 patent contemplate a symbol-by-symbol analysis for
12 determining the time-domain resource of the first radio signal. And in fact,
13 if we look at figure 7, the specification simply states that the second radio
14 signal indicates the start time point of the first radio signal in the first time
15 unit, and the start time point is used for determining the time-domain
16 resource occupied by the first radio signal in the first time unit. And so you
17 can see in this embodiment, which again the parties have agreed is
18 representative of claim 1, the second radio symbol -- the second radio signal
19 is simply indicating the start time point of the first radio signal, and it's not
20 performing an analysis for each and every symbol in the first radio signal.

21 Turning to slide 28 --

22 JUDGE HAMANN: Counsel? Counsel, I'm trying to -- referring to I
23 guess it is slide 28, your discussion, this is Judge Hamann again, to
24 understand the argument that the patent doesn't contemplate a symbol level
25 analysis. It seems like there's certainly a lot of discussion within the patent
26 and even the claim that it's sort of a -- you know, when does this occur? The

1 switch between the wide beam, for example, is on a symbol basis, and there
2 is extensive discussion about what LTE and, you know, OFDM symbols and
3 even bit streams. And so I'm trying to understand this argument. You say
4 the patent doesn't contemplate a symbol level analysis. That doesn't seem
5 consistent to me.

6 MR. CERULLI: Well, all that Apex has cited for this, and I'm happy
7 to entertain any other parts of the '081 patent that you might be thinking of,
8 Your Honor, but on slide 29, Apex points to the claim language itself. And
9 all the claim language says is as for anyone given multicarrier symbol of the
10 G multicarrier symbols, the multi-antenna related receiving for the given
11 multicarrier symbol is related to the relative position of a time-domain
12 resource occupied by the given multicarrier symbol with respect to the first
13 time point. And then it goes on to say when the time-domain resource
14 occupied by the given multicarrier symbol is behind the point, you do one
15 thing, and when it's before the time point, there's another thing.

16 So -- but nothing in that claim does it say that you do a separate
17 analysis for each and every symbol. It is only talking about one multicarrier
18 symbol. And it's not saying that the UE is making a specific determination
19 for each and every symbol. You know, Apex misstates when it argues that
20 the UE first determines whether the symbol is before and after, and then the
21 UE does a second step where it determines how to use the information from
22 the second radio signal. That's not what the claim says. And so, looking at
23 the claim language itself, it doesn't require that this analysis is -- there's an
24 analysis performed for each and every symbol. And --

25 JUDGE HAMANN: I'm sorry. I didn't mean to cut you off, Counsel.

26 MR. CERULLI: No, go ahead, Your Honor.

1 JUDGE HAMANN: Well, it certainly seems that the claim says when
2 a symbol is before the first time point, it's a wide beam, for example. And
3 when it's after that time point, it's another. So to that extent, it's another
4 beam. To that extent, you know, there is a symbol-by-symbol analysis. I'm
5 just trying to understand the focus of the argument that there's not. And I
6 just want to make sure I'm not missing anything.

7 MR. CERULLI: Yeah, and, Your Honor, I think to that extent, it is
8 present in the prior art. That's exactly what the prior art is showing. You
9 know, we talked about *Lee*, and we'll get to *Chen*. They, just like the '081
10 patent, have a block of symbols before the time point using one beam and
11 after the time point using another beam. And so, to the extent -- and that's
12 why, you know, in our reply, even applying Apex's construction, we still
13 think that we win. And so perhaps we can move to that if it's helpful, Your
14 Honor.

15 So, turning to slide 31. As I noted, regardless of whether we apply
16 Apex's construction, *Lee* still discloses the symbol limitations. As we can
17 see here, *Lee* discloses control blocks that are used for determining the time
18 frequency. It also refers to as resource allocation information associated
19 with TB1 and TB2.

20 Now, Apex doesn't dispute this. Instead, Apex is disputing whether
21 the control data blocks are used for determining that information for each
22 symbol. But *Lee* does disclose this. *Lee* discloses that the entire transport
23 block, and that includes all of its symbols, is sent before a first time point.
24 And *Lee* also discloses that the entire transport block, TB2, and thus all of its
25 symbols, is sent behind the first time point. And so, in this example, in
26 figure 12 of *Lee*, the control data is being used for determining this time-

1 domain resource occupied by each of the symbols that are contained within
2 the transport block. And so, even applying Apex's construction, which,
3 again, we don't agree with, it, doesn't change the outcome because *Lee* still
4 discloses the symbol limitations.

5 Now, unless there are any further questions on the *Lee* ground, I'd
6 like to talk briefly about the *Chen* ground.

7 So if we can go back to slide 9. So, similar to *Lee*, *Chen* also
8 discloses the same beam switching procedure that's claimed in the '081
9 patent. And as we can see here, *Chen* discloses a second message shown in
10 blue, followed by a first message shown in green. And just like the '081
11 patent, the first message is broken up into two parts with a beam switch that
12 occurs during the transmission of the first message. And this is because,
13 consistent with the claim language, the first part of the first message uses a
14 beam that's related to the second message and the second part of the first
15 message uses a beam that's indicated by the second message.

16 Now, turning to -- I'm skipping ahead a little bit to slide 34. There
17 are two disputes in *Chen*. The second dispute is more or less the same as the
18 dispute that we just discussed with respect to *Lee* regarding the symbol
19 limitation. The first argument relates to whether it would have been obvious
20 to use a first bit block to generate the first radio signal. And so I'm going to
21 start with that first argument.

22 Turning to slide 36. So the petition relies on the combination of
23 *Chen* and *Lee* to disclose the claimed first bit block used for generating the
24 first radio signal. But rather than address the combination of *Chen* and *Lee*,
25 Apex improperly attacks each reference individually. And as the Federal

1 Circuit has recognized, for example in the *Bradium Techs.* case, you can't
2 overcome obviousness by attacking references individually.

3 Now here, Apex largely ignores *Chen* and focuses just on whether
4 *Lee's* MAC PDU, which was cited for the claim's first bit block, generates
5 one or two radio signals. Now, the petition only relies on *Lee* for its use of a
6 bit block for generating the data message. It doesn't propose bodily
7 incorporating the entire embodiment from *Lee*.

8 And so if we turn to slide 37, as we can see here, the petition relied
9 on its expert testimony of Dr. Kakaes. And as we can see on -- in paragraph
10 196, Dr. Kakaes explained that it is "well known to a POSITA that a data
11 message may be generated using a bit block, which is a group of bits." Now,
12 Apex doesn't dispute this, nor does it dispute that *Lee's* MAC PDU is a well-
13 known bit block.

14 And if we turn to slide 38 in paragraph 207, so Dr. Kakaes cites to
15 *Lee* as one example of a bit block that's being used to generate a data
16 message and states, again, in paragraph 207, about partway through, "A
17 POSITA would have understood that *Lee's* disclosure simply provides
18 additional details and explanations about *Chen's* data message -- how *Chen's*
19 data message is generated and modulated in time and frequency domains,
20 and, thus, it would have found it obvious to look to the conventional
21 procedure described to understand and implement the details not expressly
22 described in *Chen's* method."

23 And so you can see, the combination set forth in the petition simply
24 seeks to incorporate the use of these well-known bit blocks into *Chen's*
25 method, such that *Chen's* data message is generated using the first bit block.
26 And now Apex's arguments, attacks against *Lee's* disclosure individually are

1 relevant because these arguments fail to properly consider the combination
2 as a whole.

3 Turning to slide 40, unless there are other questions on that first bit
4 block argument, as we discussed with respect to *Lee*, Apex's construction for
5 this symbol limitation is wrong and it should be rejected. But even if it were
6 accepted, just like *Lee*, it doesn't affect the outcome for *Chen*.

7 Turn to slide 44. The combination of *Chen* in view of *Lee* renders
8 obvious this claim limitation even under Apex's construction. And as we
9 see, just like with *Lee*, *Chen* discloses that its second message is used for
10 determining scheduling information or time frequency information
11 associated with its first message. Apex doesn't dispute this. And Apex also
12 doesn't dispute the incorporation of *Lee*'s teachings of multicarrier symbols
13 in *Chen*.

14 What Apex does dispute is whether the second message in the
15 combination of *Chen/Lee* is used for determining this time frequency
16 information for each symbol in the first message. And, you know, as I
17 stated, the combination of *Chen/Lee* does disclose it. As we can see in
18 figure 4 of *Chen*, *Chen* discloses that the entire first part of the first message,
19 and thus all of its symbols, is sent before the first time point while the entire
20 second part of the first message, and thus all of its symbols, is sent behind
21 the first time point. And so, viewing the combination of *Chen* and *Lee*, the
22 second message is used for determining the time-domain resource occupied
23 by each symbol in the first message.

24 Now, just --

25 JUDGE HAMANN: Mr. Cerulli, you have about five minutes left,
26 but please continue.

1 MR. CERULLI: Yeah, thank you, Your Honor. Just one more point
2 before I stop for now.

3 If we look at slide 49, I think this was pointed out or this has been
4 briefed thoroughly, but just wanted to point out that the parties have
5 provided different definitions for a POSITA. And despite what Apex says in
6 its slides, Petitioner doesn't agree that generic experience with
7 telecommunication is good enough. And, you know, I think the reason for
8 maybe wanting to focus on generic telecommunication systems is because
9 Mr. Gomez doesn't have the required education or wireless experience to
10 understand some definitions. And so we believe that the Board should
11 disregard Mr. Gomez testimony. But at a minimum, Dr. Kakaes' testimony
12 should be weighted over Mr. Gomez's testimony.

13 And unless there are any further questions, I'll reserve the balance of
14 my time.

15 JUDGE HAMANN: Actually, this is Judge Hamann. I do have a
16 question on slide 49 looking at the definition of Petitioner's level for
17 ordinary skill, and I'm trying to understand the aspect of it. Particularly, it
18 says "at least two years of experience working with telecommunications
19 systems, including multiple-input, multiple-output (MIMO) technology."
20 You know, "telecommunication systems" is broad. It's broad, at least in my
21 opinion, a broad concept. So, you know -- and including the MIMO
22 technology. That just seems to be an aspect. It doesn't necessarily seem like
23 to me that Petitioner's necessarily saying you need two years of MIMO
24 technology experience. And really what that entails is that MIMO, I think,
25 was around for a period of time for just multipath considerations.

1 And so I'm trying to understand why Petitioner is of the view that,
2 you know, with the breadth of what telecommunication systems is, is why
3 Mr. Gomez's experience in telecommunications systems would not be
4 sufficient for Petitioner's definition that's provided here.

5 MR. CERULLI: Yeah. So, Your Honor, we think that MIMO
6 technology experience is required to meet the definition of a POSITA. And
7 the reason is, as you noted, Your Honor, there are -- you know,
8 telecommunications goes back to, you know, the '80s or perhaps even
9 earlier. The technology then was very different than it is now. And so, you
10 know, certainly I think the experience Mr. Gomez has is well before the
11 MIMO technology that's at issue in this patent. And so, you know, it's our
12 belief that to meet the level of ordinary skill, you would have to include at
13 least some MIMO experience.

14 JUDGE HAMANN: Thank you.

15 MR. CERULLI: Now, unless there are any further questions, I'll
16 reserve the balance of my time.

17 JUDGE HAMANN: I see none, Mr. Cerulli. I believe you have 2
18 minutes remaining, so you'll have 17 minutes for rebuttal.

19 MR. CERULLI: Thank you, Your Honor.

20 JUDGE HAMANN: If you could remember to mute yourself that
21 would be good.

22 MR. CERULLI: I will.

23 JUDGE HAMANN: And Mr. Pymonto, how much time, if any,
24 would you like to reserve for surrebuttal?

25 MR. PYMENTO: I'll reserve 15 minutes, if that's okay, Your Honor.

1 JUDGE HAMANN: Certainly. I will before endeavor to give you a
2 time warning, but please track your time. It may be helpful. You may begin
3 when you're ready.

4 MR. PYMENTO: Sure. On page 5 of Apex Beam's demonstratives
5 we talk about the distinction between the first radio signal and the second
6 radio signal. And I think from Petitioner's presentation just now, we can
7 begin to see that there really is no distinction, at least that they're suggesting,
8 between what a first radio signal is and what a second radio signal is. I just
9 want to clarify for the record that, you know, we proposed -- Apex Beam
10 proposed that a radio signal is a signal that transmits particular radio
11 information.

12 As we heard, Mr. Gomez had testified that, sure, a radio signal can
13 incorporate resource information and modulation information, but, for
14 example, just to clarify it, it has to be particular radio information. For
15 example, one signal would not include one set of modulation information
16 and a second set of modulation information. Then those would be two
17 different signals. So --

18 JUDGE RAEVSKY: This is Judge Raevsky. Could you please help
19 me understand what you mean by "particular"?

20 MR. PYMENTO: So, "particular" means that there can't be two
21 different kinds of the same information. For example, the example I gave
22 was modulation information, but the same could be true for resource
23 allocation information. So you wouldn't have two different kinds of
24 modulation information within one signal because that would make that two
25 different signals. Or, for example, for resource allocation, I think the
26 distinction is even more clear where you can't have two different resource

1 allocations within the same signal. Again, those would be two different
2 kinds of -- two different signals.

3 JUDGE HAMANN: Mr. Pymonto, this is Judge Hamann. If you can
4 go to a slide that has what Patent Owner set forward for its proposed
5 construction, the radio signal, that would be helpful. I'm trying to find
6 where that's clear in Patent Owner's slides.

7 Oh, I'm sorry, it's right here, slide 5.

8 MR. PYMENTO: Yes, it would be at 5.

9 JUDGE HAMANN: I'm trying to understand what's been set forth, a
10 signal that transmits particular radio information. Obviously, there's the
11 question that's already been raised, what's meant by "particular," but also
12 "radio information" seems -- you know, what's meant by "radio" in this
13 context?

14 MR. PYMENTO: Yes. On this point, I think we actually agree with
15 Petitioner that radio information can be something that's read broadly. I
16 think the '081 -- Apex Beam believes that the '081 patent does create a broad
17 spectrum of things that could be considered radio information.

18 One thing that does distinguish it, though, and you can see figure 5
19 of the '081 patent shows that it has information regarding different signals
20 and a distinction between, for example, second information, first
21 information, third information, and then what it calls a first radio signal and
22 second radio signal. So it's not everything that can be considered a radio
23 signal, but a specific type of information. For example, what Mr. Gomez
24 mentioned as resource or modulation information could be radio information
25 in particular.

1 JUDGE HAMANN: Let me ask this. You referenced the information
2 that's being sent, the second and the third and the first, for example. It says
3 transmitting, you know, that information. How's it transmitted? There's no
4 disclosure here, is there?

5 MR. PYMENTO: I'm sorry, Your Honor. How is what transmitted?

6 JUDGE HAMANN: I'm looking at slide 5, figure 5, for example, it
7 says "transmitting second information."

8 MR. PYMENTO: Yes.

9 JUDGE HAMANN: How's that transmitted?

10 MR. PYMENTO: The UE transmits the second information
11 according to figure 5. So there are components within the UE, like a
12 transceiver, and that would transmit second information.

13 JUDGE HAMANN: Okay.

14 MR. PYMENTO: And that's incorporated in a signal. That's a
15 separate kind of signal that's not considered, at least by the patent, as a radio
16 signal.

17 JUDGE HAMANN: I guess that's what I'm trying to get to. As we
18 said in the Decision on Institution, we viewed at the time, at least, radio
19 signal to be broad. And we stepped through on pages, I believe, it was 17
20 and 18 of the Decision on Institution exactly why we considered it a radio
21 signal and we considered that to be at the physical layer. As you recognize,
22 the challenged patent has a discussion about the PHY layer and layers 2 and
23 3 above that.

24 And I don't -- you know, we, I think, provided a good amount of detail
25 of our thinking as to that, and I don't see Patent Owner addressing that
26 whatsoever in its response.

1 MR. PYMENTO: Apex Beam didn't think it was necessary, in view
2 of the specification, to particularly address that. I think, you know, we agree
3 with the discussion in the Institution Decision, but I think the patent itself
4 makes it clear that there are different kinds of signals. For example, Mr.
5 Gomez testified, there are five signals, two of which are considered radio
6 signals. So there has to be some sort of distinction between the three signals
7 classified as second information, first information, third information, and the
8 first and second radio signals, which also must be, you know, separate
9 signals.

10 JUDGE HAMANN: But you're suggesting also that the signals that
11 have this information, second information have to be transmitted, correct?

12 MR. PYMENTO: That's correct, transmitted and/or received,
13 depending on the perspective of the UE and base station.

14 JUDGE HAMANN: Okay. And how is that transmitted? Is that
15 going to be transmitted at radio frequency?

16 MR. PYMENTO: Yes, it would be transmitted at a radio frequency. I
17 don't think we disagree with what was stated in the Institution Decision
18 about using the physical layer or the mode in which a signal is transmitted or
19 received. It's a distinction between the kind of information that's transmitted
20 or received, and that's how we would distinguish one signal from another.
21 There needs to be -- basically, there needs to be some mechanism by which
22 we can distinguish one signal from another. Otherwise, we just have an
23 amalgamation as Petitioner suggests the transport blocks are, two separate
24 transport blocks can be one signal. Quite frankly, the previous blocks
25 transmitting the code words or the transport blocks could be amalgamated

1 together to form one signal. The possibilities are endless if we don't have
2 something distinguishing what a signal actually is from another signal.

3 JUDGE HAMANN: Let's take this back to first principles, Mr.
4 Pymento. In a sense, a radio signal, as we talked about in the DI, you know,
5 what is that? That's really just -- and this part isn't in the DI, but it's a carrier
6 wave that has information modulated onto it. Is that fair?

7 MR. PYMENTO: That's fair.

8 JUDGE HAMANN: And the radio signal itself, you know, doesn't
9 necessarily -- it doesn't turn on what that information is. It's still an RF
10 signal that is transmitted between, for example, the UE and the base.

11 MR. PYMENTO: That's fair.

12 JUDGE HAMANN: So I'm trying to understand, in the context of
13 claim 1, why, you know, it doesn't, you know, detail anything about, you
14 know, first information, second information; why Patent Owner is trying to
15 change, you know, the broad understanding that we had in the DI of what a
16 radio signal is, to limit it to particular types of information, whatever that
17 may be. It seems --

18 MR. PYMENTO: It sounds like -- I'm sorry. Go ahead.

19 JUDGE HAMANN: I should say it seems like figure 5, which talks
20 about setting up some the time point and other things, you know, it doesn't
21 necessarily bear on exactly what a radio signal is.

22 MR. PYMENTO: You're right, Your Honor. It doesn't tell you
23 exactly what the radio signal should contain and the type of information that
24 must be in the radio signal, but it does distinguish between the types of
25 signals. So all Patent Owner was really trying to get at between particular

1 radio information is that there needs to be something to distinguish between
2 one radio signal and the other.

3 JUDGE HAMANN: So it's Patent Owner's position that the signal
4 that carries the first information, for example, is not a radio signal. Is that
5 correct?

6 MR. PYMENTO: That is correct. The patent does distinguish
7 between receiving second information, for example, transmitting first
8 information as separate and apart from what it considers a second radio
9 signal. But a person of ordinary skill in the art would not dispute that the
10 second information, which is, you know, a name that's given to it, it's a
11 nomenclature, is itself a signal.

12 JUDGE HAMANN: Thank you. I understand Patent Owner's
13 position.

14 MR. PYMENTO: Turning to slide 6 of Patent Owner's
15 demonstratives, the content for the first information signal is a first time
16 point, and the content for the second information is a candidate scheme for
17 the first time point. This sort of goes back to the previous slide, where we're
18 saying that, you know, there's information that's attached and corresponds to
19 what each of the signals are, and why they should be distinguished from one
20 another. And I think Your Honor understands the point that we were trying
21 to make, which is that each of these has meaning, and we can't just
22 amalgamate all of the signals together.

23 You know, as Petitioner pointed out, Mr. Gomez testified that, sure,
24 if the content is changing, the information itself is changing, so you have a
25 different radio signal, if you have one type of information, for example a
26 modulation information, and then another signal with different modulation

1 information, those would be two different radio signals. And that testimony
2 is, again, shown on slide 7 of our demonstratives as well. But Petitioner --
3 or that testimony from Mr. Gomez, I'm not sure exactly why there was
4 confusion on Mr. Gomez's testimony, which is consistent with Patent
5 Owner's construction.

6 I actually do want to turn to Samsung's -- Petitioner's demonstratives
7 itself on page -- on slide 8 because Your Honor brought up a very interesting
8 point with respect to the distinction between 4G and 5G. And while it is true
9 that a lot of the terms taken in isolation are related to 4G, I think, it is
10 actually important to note the differences between 4G and 5G for the
11 purposes of this patent, which talks about a more -- and I'll just describe
12 what Patent Owner perceives as the inventive concept of the '081 patent,
13 which is that it provides a more granular level, a symbol-by-symbol basis by
14 which you can determine a first time point and switch beams at that time
15 point.

16 As Your Honor mentioned and indicated, a time-domain resource is
17 occupied. So there are several types of resources, frequency domain
18 resources. As we mentioned, you know, a signal can be transmitted over
19 certain frequency bands. That's a frequency domain resource. There's also a
20 time-domain resource. And so, put simply, it's the time in which the symbol
21 is transmitted over within a signal, the signal being comprised of symbols.
22 And so the inventive concept of the '081 patent is tied to what has been
23 incorporated in 5G, specifically in the way it schedules units; 4G, for
24 example, splits its scheduling units in subframes while 5G talks about slots,
25 and slots are also comprised of symbols.

1 And this patent talks about a more granular level in which it
2 determines each multicarrier symbol's time-domain resource, and then from
3 there can indicate where it will make the beam switch, as opposed to what
4 you can see on slide 8 of Samsung's demonstratives, which shows on the
5 right side *Lee*, you have a more macro basis where there's two big transport
6 blocks and you can only decide within the two separate transport blocks.
7 The '081 patent alleviates the need of having transport blocks in the first
8 place because it can take that first radio signal and split it in two because it
9 does it on a granular symbol-by-symbol basis. You would not be able to do
10 that within what appears to be the 4G system of *Lee*.

11 JUDGE HAMANN: Mr. Pymento, you say, I'm going to make sure I
12 follow your point, looking at a symbol on an individual basis, may not be the
13 exact words you used, but I think that's the concept. Now, obviously, the
14 symbol stream, for example, is when you're looking at the time domain, you
15 know, time's increasing. So, for example, if one signal is determined to be,
16 let's say, behind is the terminology used the first time point, aren't all the
17 other symbols that follow that therefore, by definition, in the time domain at
18 least behind that first time point?

19 MR. PYMENTO: That's correct. If one symbol is behind a time
20 point, subsequent symbols in the time domain would also be behind the time
21 point.

22 JUDGE HAMANN: Okay. And so when you're saying you look at
23 an individual basis for making a determination, I'm trying to understand
24 exactly the granularity you're referring to.

25 MR. PYMENTO: Sure. The time point also has to be determined.
26 And the way to do that is by analyzing the time-domain resource that's

1 occupied by each of the G multicarrier symbols within the first radio signal.
2 And that is the way that the first time point is determined rather than having,
3 for example, two transport blocks as in *Lee*, where the barrier, for lack of
4 better words, between the two transport blocks would be the first time point.

5 JUDGE HAMANN: Where is there anywhere within claim 1 where it
6 says that the first time point is determined? It seems to be just a given.

7 MR. PYMENTO: It is a given, but -- in a sense, but it is described in
8 the claim language itself. For example, on slide 9 of Patent Owner's
9 demonstratives, we highlight a few sections that a person of ordinary skill
10 would understand reveals that each one of the time-domain resources of the
11 G multicarrier symbols has to be determined by a second radio signal. That
12 is the point of the second radio signal. So, for example, it says the second
13 radio signal determines the time-domain resource occupied by the G
14 multicarrier symbols, which is the claim term in dispute. And then it
15 proceeds to say that as for any one given multicarrier symbol of the G
16 multicarrier symbols, the multi-antenna related receiving for the given
17 multicharacter symbol is related to the relative position of any time-domain
18 resource in the singular occupied by the given multicarrier symbol with
19 respect to a first time point in the time domain. So a person of ordinary skill
20 in the art, and probably even not a person of ordinary skill in the art, would
21 read that to understand that this is a symbol-by-symbol basis. And the first
22 time point in the time domain is determined also because the multicarrier
23 symbol time domain resources are split up within the second radio signal.

24 JUDGE HAMANN: Thank you.

25 MR. PYMENTO: That really is the basis for our claim construction
26 read for the disputed term, which is the second radio signal is used for

1 determining a time-domain resource occupied by the G multicarrier
2 symbols, you know, to the extent that the plain and ordinary meaning of the
3 words themselves don't illustrate that understanding. And so, you know, to
4 the extent that Patent Owner was trying to clarify it, as Petitioner put it, I
5 mean, we're trying to make -- we're trying to clarify, our constructions are
6 meant to clarify what these terms mean to the extent that it's not so clear
7 from the language of the claim itself, which, as you might be aware, is a
8 translation. The patent is a translation, which may explain what Your Honor
9 brought up earlier, why there's some -- a little bit of loosey-goosey with
10 some of the terms, meaning that, you know, a signal is a PDCCH or is
11 another type of signal. You know, as Your Honor and Petitioner pointed out
12 and agreed upon, it's just a signal that was sent over that channel.

13 JUDGE RAEVSKY: Mr. Pymonto, this is Judge Raevsky. I just
14 want to clarify my understanding of what you just said. So are you saying
15 that the claim language itself is unclear and doesn't itself support this
16 construction, it's coming from somewhere else?

17 MR. PYMENTO: We think that the claim language does support the
18 construction. That's the basis of our argument. We're just saying that, you
19 know, there's some confusion from Petitioner's end about what the claim
20 language specifically says, which is why, for clarity's sake, we propose the
21 construction to highlight what was being said in the claim.

22 JUDGE HAMANN: Mr. Pymonto, this is Judge Hamann. Just two
23 small things. One, obviously, the claim uses the word "behind". I think
24 we're all treating that as "after". Is that a fair reading of the word "behind"?

25 MR. PYMENTO: Yes, Your Honor, that is fair.

1 JUDGE HAMANN: And secondly, I'll note Patent Owner cites to, I
2 guess, the declaration of Mr. Gomez to dictionary definitions, yet those
3 dictionary definitions aren't in evidence. How should we handle that?

4 MR. PYMENTO: I think, as Your Honor pointed out earlier, the
5 dictionary definitions were relied upon by the expert to demonstrate his
6 understanding of what the first radio signal and second radio signal is, I
7 think particularly with respect to the dictionary definition of control signals.
8 And so it should be taken in whole with the expert declaration as showing
9 why the expert believes what he believes and not necessarily for the
10 dictionary definition itself.

11 JUDGE HAMANN: Okay. So if I follow your point, that it would be
12 support for Mr. Gomez's declaration testimony, so it, therefore, is not
13 conclusory, for example, in that we need not and maybe should not consider
14 as a dictionary definition in and of itself?

15 MR. PYMENTO: That's correct, Your Honor.

16 JUDGE HAMANN: Thank you.

17 MR. PYMENTO: And just to clarify, but the declaration itself is
18 evidence, and so that is why the understanding of it provides -- or proffers,
19 you know, Mr. Gomez's understanding as written in this declaration.

20 Turning to the prior art arguments themselves, if we could turn to
21 slide 11 of Patent Owner's demonstratives, you know, this sort of ties into
22 the claim -- this does tie into the claim construction issues that we've raised.
23 I don't think Petitioner went into such detail as to explain what exactly figure
24 12 of *Lee* is showing, but Patent Owner will endeavor to explain what each
25 of those blocks really are supposed to represent.

1 So, Petitioner doesn't actually identify a single radio signal with
2 information as one incoming second radio signal. B1 1203 and B1 1204 in
3 *Lee's* figure 12 are each blocks that include code words that are provided in
4 it in a controlled transmission beam and correspond to the subsequent
5 transport blocks. In other words, each of B1 1203 and B1 1204 correspond
6 to each of TB1 and TB2. A person of ordinary skill in the art would not
7 look at that and say, okay, B1 1203 and B1 1204 are each part of the same
8 signal because they each contain two different code words in those signals.

9 And, you know, we -- Patent Owner questioned Dr. Kakaes on this
10 issue, and he seemed to agree as well that these are two different signals. On
11 page -- on slide 12 of Apex Beam's demonstratives we see that Dr. Kakaes
12 has confirmed that these B1 1203 and B1 1204 contains different particular
13 information. And it sort of gives more insight into what we meant by
14 different particular information: two different code words that, for lack of
15 better words, conflict with different code words that correspond to different
16 transport blocks or different radio signals.

17 JUDGE HAMANN: Mr. Pymonto, this is Judge Hamann. I'm trying
18 to understand what layer you're referring to these code words at in the
19 context of the '081 patent. It doesn't seem to be the PHY layer.

20 MR. PYMENTO: Your Honor, that's a very good point. And
21 actually, we didn't really look too deep into that. But you know, in
22 accordance with your Institution Decision, if a radio signal is supposed to
23 correspond to a physical layer, then indeed, this is just one other reason why
24 the code words in B1 and B2 are not -- do not correspond with this claim
25 limitation for second radio signal.

1 JUDGE HAMANN: Let me be clear. I'm just trying to understand in
2 the context of the argument where we're at because, obviously, *Lee* talks
3 about these code words, but we've also seen argument that that's a disclosure
4 at a certain level, but it is a bit stream. I can't remember the exact
5 terminology that was used when you, you know, look at it as a single
6 symbol. So I'm trying to understand what you mean by "signal" in that
7 context because it seems to be your focus on code word here from *Lee*,
8 which may be at one layer, but there's other layers to consider code word at
9 in *Lee*, including some that, I think, as we discussed in our DI. I'm just
10 trying to understand where your argument seems to be focused on a different
11 layer here.

12 I agree, *Lee* discloses code words, but, you know, that doesn't -- you
13 know, obviously, therefore, that's at one layer, but there's stuff at different
14 layers. I think that was the scope of Petitioner's argument, too. So I'm just
15 trying to understand how that marries up. Forgive me if I'm not clear.

16 MR. PYMENTO: No, I understand. Thank you, Your Honor. The
17 way that Patent Owner approached this issue was looking at the petition.
18 And the petition seems to map each of the B1s together collectively as the
19 claimed second radio signal. And when Patent Owner looked at *Lee*'s
20 disclosure, and particularly the portion -- the paragraph 169 that was cited by
21 the petition, we found, and it says in that paragraph 169 of *Lee*, exhibit 1004,
22 that the first code word might not necessarily be the whole thing, but the first
23 code word is provided in a controlled transmission beam. So, yes, Your
24 Honor, each of the B1s is a controlled transmission beam, so those are two
25 separate controlled transmission beams, each containing separate code
26 words.

1 And then when we ask Dr. Kakaes about what those would be, on
2 slide 12 of our demonstratives, Dr. Kakaes confirmed that each of them is a
3 controlled transmission beam that contains two different code words. So, for
4 example, he says that each of 1203 and 1204 does contain a code word and
5 the code word corresponds to different DCIs, to the DCI that provides the
6 downwind controlled information for the respective data, meaning two
7 different data pieces.

8 JUDGE HAMANN: But B1 -- 1203 and 1204, they're consecutive in
9 the time domain, is that correct?

10 MR. PYMENTO: They are consecutive in the time domain. It
11 appears so for figure 12, anyway.

12 JUDGE HAMANN: Okay. And I'm trying to recall the discussion.
13 What was the discussion as to how they relate as to channel, on the same
14 frequency channel?

15 MR. PYMENTO: I believe that they would be on the same channel,
16 but that does not absolve the fact that they would be -- they're conveyed
17 differently and provide different information. And really -- so, for example,
18 two signals, in layman's terms even, could be transmitted back-to-back. The
19 fact that they're transmitted back-to-back does not make them one signal,
20 which seems to be what Petitioner is arguing, that the fact that it's in the time
21 domain back-to-back, it includes maybe the same sort of information, they
22 both contain code words, means that they can be the same radio signal. And
23 that's just simply not the case.

24 Again, as Dr. Kakaes mentioned, they might be the same structure.
25 For example, he says in his deposition on slide 12 of our demonstratives, but
26 the specific values will be different in 1203 and 1204 because the transport

1 blocks, TB1 and TB2, are located in different places on the time and
2 frequency resources. They're using different beams, at least with respect to
3 the transport blocks. And that information is conveyed in each of 1202 --
4 1203 and in 1204 for the respective portions of what he calls the respective
5 portions of the signal representing the data in TB1 and TB2. So the fact that
6 they're transmitted back-to-back in the time domain, Patent Owner believes
7 is of no moment.

8 JUDGE HAMANN: Thank you.

9 MR. PYMENTO: There is a similar argument on slide 13 of Patent
10 Owner's demonstratives with respect to the first radio signal. Again, they're
11 two different information pieces, which means that they're two different
12 signals, if signals at all. And figure 12, as described by *Lee* in paragraph
13 167 of exhibit 1004, specifically describes it as a dual transport block
14 transmission scheme, where it says, "Two or more transport blocks may be
15 transmitted with the same beam as the control channel, or may be
16 transmitted with different beams." It then goes on to describe them as
17 individual transport blocks which, you know, may use the same beam.
18 Certainly different signals can use the same beam. That doesn't mean that
19 they are the same signal. And as we noted above, each transport block in a
20 dual transport block transmission scheme is associated with separate code
21 words, separate transmission beams, and, therefore, comprises separate
22 information in our separate signals.

23 JUDGE HAMANN: Mr. Pymonto, this is Judge Hamann. I'm trying
24 to understand the different transport blocks. Each -- the transport blocks are
25 comprised of symbols. Is that fair?

1 MR. PYMENTO: That is fair. Well, the transport blocks could be
2 comprised of symbols. I'm not sure that's really disclosed in *Lee*. In '081
3 patent, certainly, if transport block was understood to be a signal, it would
4 be comprised of multicarrier symbols. It's not clear, at least from figure 12
5 of *Lee*, that the transport blocks are comprised of symbols.

6 JUDGE HAMANN: Thank you.

7 MR. PYMENTO: Again, Dr. Kakaes on slide 14 of Patent Owner's
8 demonstratives confirms that *Lee*'s transport block, the first transport block
9 and the second transport block, they contain different pieces of information.
10 They're actually on different places on the time frequency resources, and
11 they use different beams, which, of course, is known as beam switching, and
12 that's fine. But the fact that they are on different places on the time
13 frequency resources seems to undercut the issue of doing a symbol-by-
14 symbol basis where the symbols themselves occupy different time resources.
15 But with respect to the first radio signal itself, Dr. Kakaes is pretty clear that
16 the two transport blocks are, in fact, located at different places on the time
17 frequency resources.

18 JUDGE HAMANN: Counsel, I'm just trying to understand different
19 places. Obviously, two symbols can't occupy the same time resource,
20 correct?

21 MR. PYMENTO: That's correct.

22 JUDGE HAMANN: On the same frequency. I don't mean to
23 complicate the question, but so what's meant by different places? If you
24 have a stream of symbols, for example, by definition, isn't that stream going
25 to occupy -- you know, symbols are going to occupy different places on the
26 time domain?

1 MR. PYMENTO: The symbols would occupy different places on the
2 time domain, but the symbols themselves, at least in the '081 patent,
3 comprise one signal. Here, even assuming that each of the transport blocks
4 is comprised of symbols, which we do not necessarily agree with, the two
5 symbols -- the two signals themselves, the transport block 1 and transport
6 block 2, occupy different places both in time and frequency, and a person of
7 ordinary skill in the art would understand that as being two separate signals
8 because one signal can't be transmitted over different time and frequency
9 resources.

10 JUDGE HAMANN: Thank you.

11 JUDGE O'HANLON: Mr. Pymonto, this is Judge O'Hanlon. If the
12 two blocks were sent on the same frequency, will they still be different
13 signals in your understanding?

14 MR. PYMENTO: If they were transmitted over the same time and
15 frequency resources, then I think there would be greater reasoning for
16 assuming that those would be the same signal. But the fact that they are not
17 in *Lee* is further evidence that they are, in fact, two different signals, because
18 they can't occupy the same time and frequency resources in *Lee*.

19 JUDGE O'HANLON: I was asking just the same frequency.
20 Obviously, in the figure, I forget the figure number, they're consecutive in
21 time, but they're still on the same frequency. And you're understanding
22 that's two different signals still. Is that correct?

23 MR. PYMENTO: Your Honor, that would be my understanding,
24 yes. They would be separate signals if they occupy different bands,
25 frequency bands.

1 JUDGE O'HANLON: I'm saying the same frequency bands; the
2 same frequency, different times, consecutive times.

3 MR. PYMENTO: If it's sent on the same frequency band at different
4 times, those would be still separate signals.

5 JUDGE O'HANLON: So how do you know the end of one signal
6 and the beginning of the next signal?

7 MR. PYMENTO: And that's precisely why Patent Owner provided a
8 construction. It depends on the information and the content. For example,
9 on one, if you have the same frequency, different times, in one time you
10 would transmit, for example, one modulation information and in another
11 time you transmit a different kind of modulation information. And actually,
12 I mean, that seems to be what *Lee* is doing, where there is one piece of
13 information, for example, one code word in one time, and then in a
14 consecutive block, B1 1204, that's a totally different piece of information.
15 The same is true of the individual transport blocks and the dual transport
16 block transmission scheme.

17 JUDGE O'HANLON: So the signal ends when one block of
18 information -- the transition of one block is complete. Is that what you're
19 saying?

20 MR. PYMENTO: That is correct, Your Honor. Otherwise, any
21 subsequent transmission of one signal after another signal on the same
22 frequency band would be considered the same signal in all contexts. That
23 would basically negate the -- it would render meaningless the words and
24 signal.

25 JUDGE O'HANLON: Okay. I'm just trying to understand what you
26 mean by signal.

1 MR. PYMENTO: Sure, Your Honor. What Patent Owner is trying
2 to say is that signal has to have a meaning. And there needs to be something
3 that cuts off one signal and begins another signal. And that should be true
4 even if two signals are sent back-to-back. And what we -- what I understand
5 your question to be is that where is the cutoff between two consecutive
6 signals? And that's why Patent Owner proposed the construction that it has
7 to be information that provides the cut off. Otherwise, if it's sent on the
8 same frequency band back-to-back in the time domain, anything transmitted
9 back-to-back would be considered the same signal.

10 JUDGE O'HANLON: Well --

11 JUDGE HAMANN: Mr. Pymonto, this is Judge Hamann. In the
12 context, again, at claim 1, where it says receiving a second radio signal, for
13 example, you know, receiving -- the mobile -- sorry, the mobile receiving a
14 radio signal, I mean, that's what you're going to have. You have a carrier
15 wave with information modulated on it. I don't see where the distinction is
16 to, you know, whether -- what, you know, word or however you want to put
17 it. I'm trying to -- the terminology issue is where things end and they begin.
18 It's a sinusoid, the same sinusoid, for example, modulated with information.
19 I don't see there be a distinction as to the word "signal" for where there's a
20 beginning and end as to that.

21 MR. PYMENTO: Well, I think it's almost inherent in your question,
22 Your Honor, where you're talking about specific modulation information.
23 And that itself is the signal.

24 JUDGE HAMANN: Well, no, it says a radio signal. So that's going
25 to be the carrier wave that's modulated, isn't it?

1 MR. PYMENTO: Yes, it would be that specific, you know,
2 information.

3 JUDGE HAMANN: I understand your position. Thank you.

4 MR. PYMENTO: Turning to slide 15 of Patent Owner's
5 demonstratives, we'll talk about the other claim limitation that's at issue,
6 which is the second radio signal is used for determining a time-domain
7 resource occupied by the G multicarrier symbols. And we'll just go over
8 briefly that, you know, this is obviously (inaudible) to the claim construction
9 issue we discussed earlier, where certainly the claim is clear. And our
10 construction clarifies that even further, that this is a symbol-by-symbol basis
11 analysis of the time-domain resource occupied by each of the G multicarrier
12 symbols.

13 So *Lee's* code words or *Lee's* blocks B1 1203 and B1 1204, they
14 disclose a code word that's associated with a time frequency location of an
15 entire transport block. So even if those collectively were considered to be
16 the second radio signal, meaning specifically B1 1203, B1 1204, it would
17 not disclose a time-domain resource occupied by each of the G multicarrier
18 symbols. And on that basis alone, it's pretty clear that the claim limitation is
19 not met, it's not anticipated.

20 Turning to slide 16, we just want to address what even Petitioner
21 brought up during his presentation is that a Patent Owner doesn't address
22 *Chen* and *Lee* individually. Petitioner uses some aspects of *Lee*, some
23 aspects of *Chen* combines them together, and Patent Owner is addressing the
24 aspects of *Lee* that are deficient. Specifically, you know, Patent Owner's
25 response acknowledges that the Petitioner is alleging, and Petitioner just
26 mentioned that they're alleging, that *Lee* teaches a data message generated

1 by a MAC PDU and that should be implemented into *Chen's* method. But
2 the whole concept is that Patent Owner's arguing that *Lee's* MAC PDU does
3 not generate the first radio signal that's required by the claims. For all the
4 reasons that we just mentioned with respect to why a first radio signal does
5 not exist, whether that's a MAC PDU that's now incorporated from *Lee* into
6 *Chen*, that still would not generate the claimed first radio signal because *Lee*
7 is talking about generating two different radio signals, each corresponding to
8 transport block 1 and transport block 2, and each of those are associated with
9 different code words. Instead of generating one radio signal with the
10 information with respect to all the G multicarrier symbols and then another
11 signal talking about -- you know, comprised of the G multicarrier symbols
12 themselves and time-domain resources allocated with respect to each of
13 them, such that a time point can be determined in order to switch beams.

14 JUDGE HAMANN: About six minutes in your initial allotment, Mr.
15 Pymento.

16 MR. PYMENTO: Thank you, Your Honor.

17 JUDGE HAMANN: And at some point you could turn to the Mr.
18 Gomez arguments when that's appropriate.

19 MR. PYMENTO: Absolutely. I'll briefly mention on slide 17 that
20 *Chen* actually does multicarrier symbols at all, which underscores the 4G-5G
21 distinction we were making earlier about the difference in scheduling units
22 between 4G and 5G, which explains this dichotomy between the '081 patents
23 and the prior art references with respect to a symbol-by-symbol basis.

24 On slide 18 of Patent Owner's demonstratives, we basically show
25 how Petitioner's citations to *Chen* are now applicable because they're talking
26 of -- while they described switching at a given point in time, which even *Lee*

1 admittedly does describe switching at a given point in time, there's no
2 determination of the time-domain resource occupied by each of the symbols
3 in order to facilitate determination of that time point. In fact, you need, in
4 *Lee* at least, to show that you had two separate transport blocks, and the
5 barrier between the two transport blocks is where the time point is. The
6 same is essentially true of *Chen* here, especially because *Chen* doesn't even
7 describe multicarrier symbols.

8 Turning to the issue with respect to Mr. Gomez, as Your Honor
9 mentioned pretty explicitly, and I think this is on Samsung's demonstratives
10 on page 49, if we can turn to that. Simply put, Petitioner is manipulating its
11 own definition of a POSITA. They clearly say that a POSITA must have at
12 least a master's degree and at least two years of experience working in
13 telecommunication systems, including MIMO technology.

14 JUDGE HAMANN: Mr. Pymonto? I'm not sure if anyone else -- I
15 believe his video feed just cut out. This is Judge Hamann, assuming I can be
16 heard, and I'm not the one who got cut out.

17 MR. RUBINO: He got cut out. This is Vincent Rubino, other
18 counselor for Patent Owner. I'm going to just cut next door and check on
19 him.

20 JUDGE HAMANN: Okay. We'll go off the record while we wait for
21 him.

22 (Recess)

23 JUDGE HAMANN: All right, here we go.

24 MR. PYMENTO: All right, there we go. Sorry, it appears my battery
25 died.

1 JUDGE HAMANN: No worries. You have about four minutes in
2 your initial allotment when we left off.

3 MR. PYMENTO: I think basically -- sorry, Your Honor. I think
4 basically it's a blatant manipulation of Petitioner's definition of POSITA,
5 which included "including two years." And they did offer the option of
6 having a lower, for example, degree, like a bachelor's degree. Mr. Gomez
7 had 35 years of experience, including telecommunications experience. But
8 the fact that some of it is MIMO and that perhaps that MIMO experience is
9 maybe earlier than Petitioner would have liked is of no consequence because
10 that is not part of Petitioner's definition of a POSITA. It's also not under
11 Patent Owner's definition of a POSITA. So I think that the issue is pretty
12 moot, and it's just a way to get rid of Patent Owner's expert declaration.

13 JUDGE HAMANN: Well, Counsel, this is Judge Hamann. I
14 recognize in your slide, I believe it is -- not sure which slide it is. I thought I
15 saw that Patent Owner put forward that -- it's 31 I believe it is, the Trial
16 Practice Guide. Obviously, the *Kyocera* decision in 2022 came after our
17 Trial Practice Guide that's being cited here in 2019. Patent Owner agrees
18 that for an expert to provide testimony, that expert needs to be one of
19 ordinary skill. Is that correct?

20 MR. PYMENTO: That is correct. And we do believe that Mr.
21 Gomez is a person of ordinary skill in the art and does meet the
22 classifications of an expert for the purposes of this proceeding, based on his
23 responses to the questioning during depositions, as well as his credentials,
24 which we've laid out in our demonstratives.

25 JUDGE HAMANN: Thank you.

26 MR. PYMENTO: Nothing further from me for now.

1 JUDGE HAMANN: Thank you. I believe if I did my math correctly,
2 while the cut off, you would have two minutes left, so that you also have 17
3 when we return.

4 With that, Mr. Cerulli, you have 17 minutes for your rebuttal.

5 MR. CERULLI: Thank you, Your Honor. I'll just briefly address a
6 couple points.

7 So Patent Owner raised the point that, you know, a signal has to have
8 meaning, or there's no distinction between the second and first radio signal
9 in Petitioner's interpretation. But it's the patent, the '081 patent, that defines
10 the term "radio signal" broadly. Now, the patent could have provided
11 lexicography, it could have defined it more narrowly, but it didn't. It
12 provided some examples, which Petitioner has shown are also present in the
13 prior art of *Lee* and *Chen*. And so, at a minimum, what Petitioner points to
14 meets the claims.

15 With respect to the argument about the differences between 4G and
16 5G, I believe this is the first time this argument was made by Patent Owner.
17 And I just want to be clear that the claims are not limited to 4G or 5G.
18 Patent Owner is attempting to inject additional limitations that aren't present
19 in the claims. Like the '081 patent, the reference of *Lee*, and then the
20 combination of *Chen* and *Lee* disclose multicarrier symbols, which is
21 claimed. And so I just wanted to be clear that the (inaudible) are not limited
22 to those alleged distinctions between 4G and 5G.

23 With respect to the symbols limitation, I believe Patent Owner
24 alluded to a translation issue. But, you know, as Your Honors know, that
25 doesn't excuse the use of broad language in the claims. The claim language
26 doesn't support Apex's construction, and nothing in the extrinsic evidence

1 supports it either. And I don't believe that Patent Owner has presented any
2 extrinsic evidence to support its symbols construction, aside from the
3 testimony of its expert.

4 Just a couple more points. When discussing the prior art Patent
5 Owner had mentioned that *Lee* discloses two different radio signals because
6 its control blocks have their own code words. But again, the '081 patent
7 defines "radio signal" or uses the term "radio signal" broadly. And, you
8 know, if they include different information, that doesn't make them different
9 radio signals in the context of the '081 patent. You know, you could look at
10 each symbol as having its own information or you can look at each slot as
11 having its own information. And I think it's helpful to look at slide 8 of the
12 '081 patent. If we look at figure 7, which, again, the parties have agreed is
13 representative of claim 1, there are two bracketed symbols in two different
14 time resources that are all part of the same first radio signal. And so just
15 occupying two different time resources, even in this case, the '081 patent,
16 they're using two different beams. So certainly the way the patent uses radio
17 signal is not limiting, as Apex suggests. And --

18 JUDGE HAMANN: Counsel?

19 MR. CERULLI: Yes, Your Honor.

20 JUDGE HAMANN: This is Judge Hamann looking at figure 7. I'm
21 looking at unannotated, as in the challenged patent, but, you know obviously
22 there's a disclosure as to the time domain. What is the way the patent says
23 as to the frequency domain with respect to figure 7? If anything, I recognize
24 that there's different beams, but that doesn't mean that necessarily that there's
25 different frequency channels being used.

1 MR. CERULLI: That's correct, Your Honor. I don't believe the '081
2 patent mentions the frequency of being used or the radio signals. And
3 certainly the claim doesn't address the frequency component of the first
4 radio signal.

5 JUDGE HAMANN: Thank you. I might have a similar question as it
6 relates to *Lee* and the figure you've shown with the control block and the
7 transport blocks, you know. We can do that now or whenever that's
8 appropriate in your presentation.

9 MR. CERULLI: Yeah, sure. I'm happy to address it now. I also don't
10 believe that *Lee* -- what we're seeing here is the time domain and the blocks
11 that are occupying parts of that time domain in the TTI we see here. I don't
12 believe they've addressed -- *Lee* addresses the frequency component, and
13 certainly we didn't go to that extent because the claims don't include
14 frequency limitations.

15 JUDGE HAMANN: Thank you.

16 MR. CERULLI: And just finally, the last point. Patent Owner had
17 mentioned how each of the control blocks have their own -- have a code
18 word for the entire transport block. But, you know, in this situation, *Lee*
19 discloses that the UE is providing information so that the UE can determine
20 the location of each symbol in the time domain. And so that distinction, or
21 alleged distinction, does not change the outcome here.

22 And unless there's any further questions, I'll leave the rest of my
23 time. Thank you for your time, Your Honors.

24 JUDGE HAMANN: Could you actually expand a little on that last
25 point, how we --

26 MR. CERULLI: Oh, sure.

1 JUDGE HAMANN: -- make that disclosure?

2 MR. CERULLI: Yeah. So it may be it's helpful to go to the slides.
3 Let's see, just find the correct slide.

4 JUDGE HAMANN: And you have about 10 minutes, just for your
5 information.

6 MR. CERULLI: Yeah. Thank you, Your Honor. Yeah, so we can
7 see on -- if we turn to slide 31, I believe, *Lee* discloses the control blocks
8 include the resource allocation, or in other places, the scheduling
9 information for the transport blocks. And so, as we noted earlier, *Lee*
10 discloses that the entire transport block is sent before a first time point. And
11 so that first time point, first transport block includes OFDM symbols. And
12 we state that in our petition. And likewise, after the first time point, the
13 entire transport block, TB2, is sent, and that includes all of its symbols. And
14 so, you know, as I noted, the fact that the codeword has provided for the
15 entire transport block, that entire transport block includes a group of
16 symbols. And so that's simply the point I was trying to make.

17 So if there are no further questions, I'll leave the rest of my time.

18 JUDGE HAMANN: Thank you. I don't believe there are any further
19 questions. Thank you, Mr. Cerulli.

20 MR. CERULLI: Thank you, Your Honors.

21 MR. PYMENTO: Mr. Pymento, you have 17 minutes. You can
22 begin when you're ready.

23 MR. PYMENTO: Thank you, Your Honor. Preliminarily, the reason
24 why we addressed the 4G-5G distinction was not necessarily as a new
25 argument, but it was to address a point that Your Honors rightfully brought
26 up, which is that there are certainly concepts within the '081 patent that are

1 common between 4G and 5G, which is, I think, to be expected considering
2 that 5G was a progression over 4G and the working documents that were
3 created were based on what was existing at the time, which was 4G LTE.
4 That doesn't mean that collectively '081 patent is directed to 4G, but it was
5 to highlight the reasoning why certain claim limitations are the way they are
6 and why multicarrier symbols -- multicarrier symbol-by-symbol basis is
7 disclosed in the '081 patent for determining the time point at which a beam is
8 switched.

9 Additionally, we, I think, just heard a Petitioner confirm that leads
10 B1s -- B1 1203, B1 1204 -- contain different information. They're separate.
11 We've also heard that TB1 and TB2 contain separate information. In fact,
12 the time point is between TB1 and TB2, not between any specific symbols
13 based on a determination of the time occupied by each of the G multicarrier
14 symbols, which is explicitly noted in the claim limitation itself or within the
15 clarified construction provided by Patent Owner for that claim limitation.

16 I think actually, if we turn to slide 31 off Petitioner's demonstrative,
17 we can actually see that in all the highlighting -- in all the highlighted
18 sections on the right side of this slide, I don't think there is actually a
19 mention of the word "symbol" at all despite, you know, blocks being split
20 into symbols, at least that part, and being known in the art. But the fact that
21 there's a near existence of a time point at which beams are switched or the
22 mere existence of the fact that transport blocks could be split into symbols
23 does not disclose the claim limitation. And for that reason, the obvious
24 combination of the anticipation argument ought to be rejected.

25 Unless Your Honors have any other questions, I'll yield my time.

1 JUDGE HAMANN: I see no further questions. I'd like to thank
2 certainly both parties for their time and arguments. It was very helpful. I
3 ask that the parties remain on the line after we adjourn so they can answer
4 any questions for the court reporter as to spellings or whatnot. And with
5 that, this hearing is adjourned. Thank you.

6 MR. PYMENTO: Thank you, Your Honors.

7 MR. CERULLI: Thank you, Your Honors.

8 (Whereupon, the proceedings at 4:46 p.m. were concluded.)

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