IN THE COMPETITION APPEAL TRIBUNAL

Case No. : 1382/7/7/21

Salisbury Square House
8 Salisbury Square
London EC4Y 8AP

Monday 6th October 2025 – Tuesday 4th November 2025

Before:

Mrs Justice Bacon

Derek Ridyard

Justin Turner KC

(Sitting as a Tribunal in England and Wales)

BETWEEN:

Consumers' Association

Class Representative

v

Qualcomm Incorporated

Defendant

A P P E A R AN C E S

PHILIP MOSER KC, ROB WILLIAMS KC, MICHAEL ARMITAGE, CIAR MCANDREW, DANIEL ALEXANDER KC, DAVID IVISON and CHARLOTTE MCLEAN (Instructed by Hausfeld & Co. LLP) on behalf of Consumers' Association

DANIEL JOWELL KC, NICHOLAS SAUNDERS KC, DAVID BAILEY, SOPHIE BIRD, CHARLES WALL, ALEXANDRA BRECKENRIDGE (Instructed by Norton Rose Fulbright LLP and Quinn Emanuel Urquhart & Sullivan LLP) on behalf of Qualcomm Incorporated

Thursday, 16 October 2025
(9.30 am)
MR ROBIN NOBLE (continued)
DR JORGE PADILLA (continued)
Questions by THE TRIBUNAL (continued)
THE CHAIR: Yes, Mr Saunders.
MR SAUNDERS: My Lady, I just wanted to mention one very small point of housekeeping. Just as we work through today's topics, those sitting behind me are concerned, in particular, about the rates in the agreements and the trends in the rates over time, which obviously have a lot of commercial sensitivity around them and it was —— we just wanted to just remind the experts, if at all possible, not to mention those figures in open court and, insofar as necessary, we would invite you to sit in private, if it is necessary to go into those in detail.
THE CHAIR: All right. Are the experts well aware of what figures are confidential so that we can —— you can ask us, if necessary, to sit in private? Yes, all right.
MR TURNER: Mr Noble, can I —— I know we are going to come on to discuss your bargaining model, and I just wondered if I could help just summarise, before we get into the detail, it in as simple terms for me as possible and, in particular, let us assume for present purposes that Qualcomm is in a dominant position and is negotiating

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with Apple, take Apple as the example, and Apple is required to buy —— it is necessary for Apple to buy chips from Qualcomm. We will work on those assumptions.
In those circumstances, can you just explain to me why you say this is not competition on the merits and what the result of your analysis is?
MR NOBLE: In the context of the bargaining model?
MR TURNER: Yes.
MR NOBLE: I mean, the simplest way to understand the bargaining model is it is essentially a mathematical version of the narrative ——
MR TURNER: I did not want you to explain the bargaining model; I wanted you to explain your conclusions that you are drawing on your consideration of the matters in this case, including the bargaining model.
MR NOBLE: Okay. So, to walk through the steps in the bargaining model at a high level?
MR TURNER: No, let us not go through the bargaining model. I want to know the summary of your conclusions as to why you say there is an abuse, why you say this is not competition on the merits.
MR NOBLE: So ——
MR TURNER: Having conducted your analysis, just a summary of your position.
MR NOBLE: With respect to Apple?

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MR TURNER: Yes, with respect to Apple.
MR NOBLE: With respect to Apple, at the very highest level, the logic is that there is a negotiation between Qualcomm and Apple and you can think of that as a first stage about is there going to be an agreed royalty and that first stage is influenced by a second stage, which is are you going to get access to the chips? The conclusion that I am drawing, based on the narrative discussion and the bargaining model and the evidence, is essentially that Qualcomm's choice to engage in what the Class Representative terms NLNC and RTL influences that bargain outcome and that it influences it in favour of Qualcomm and that that can be expected to result in a higher royalty rate than Apple would agree to and that Apple would agree to that and would not exercise its option to try and seek a FRAND rate and it would not exercise that option because it values access to the chips very strongly because of the assumptions that you laid out.
MR TURNER: This is because of an express or implied threat or representation that the supply of chips is at risk?
MR NOBLE: Yes, essentially.
MR TURNER: That is readily understandable, that if Apple is dependent on the supply of chips and there is a threat not to supply them, that the bargain on the royalty rate

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may not be competition on the merits, one can readily understand that.
Is it therefore necessary to consider the details of the bargaining model? I mean, that seems to be almost self—evident.
MR NOBLE: Well, I think that is why I mentioned that mathematical —— that summary before, is that the bargaining model is essentially a mathematical version of the general narrative discussion that I have set out in my report and also that the Class Representative articulates in their Particulars of Claim and the benefits of the bargaining model are that —— it forces rigorousness on you and I think we will perhaps come on in the agenda to then explore, well, does that then allow you to pull out specific propositions that you can then test and evaluate in order to kind of stress test the theory of harm and see whether it really stands up to scrutiny?
MR TURNER: Dr Padilla, just at that high level, before we get into the details of the bargaining model, do you disagree with that, that if there is —— assuming that Apple is dependent on Qualcomm for chips and Qualcomm is in a dominant position and Qualcomm threatens to withdraw that necessary supply of chips, that that is not competition on the merits when it comes to

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royalty—setting? You would agree with that, I assume?
DR PADILLA: To tell you the truth, I would have a problem in terms of what is competition on the merits because I do not see that where the competitive interaction happens. There is bargaining, but I think that, going beyond that point, could that affect the bargaining outcome? Those assumptions it could, not necessarily though, and not necessarily because we are missing a number of points there. For example, we are missing that the relationship happens over time. We would be missing, for example, the consequences for Qualcomm of not supplying to Apple. It is a threat that you need to assess, whether it is credible or not, given the amount of business that you are going to lose, the real reputational effects that that would have in the market, the fact that, you know, Apple may take you to court because it considers that that threat is anticompetitive and many other factors.

The problem when you are using theory is that theory depends on assumptions and those assumptions need to be validated by the facts and there are certain assumptions that may look very trivial, like if you anticipate that there is going to be discontinuation of supply, that means that you are going to react by agreeing to a particular rate, but that assumption in itself could

be problematic. Let me explain this by reference —— because it is a little bit tricky, if I may —— to a very well—known game, which is called the "ultimatum game". The ultimatum game is a game in which, let us say, Mr Noble and I have to split £100 and I am to make a proposal first and he has to respond and say "yes" or "no". If I propose a split, say 50, and he says, "Yes", then he gets 50. If he says "no", both of us will get zero.

The sort of logic and mathematical logic that Mr Noble uses in his model to analyse this ultimatum game would produce a single equilibrium in which I would propose 99, if the split is, you know, integer numbers, and so that he would have to get 1. If he says "yes", he gets 1, which is better than zero. So the equilibrium is 99, my proposal, 1, and he accepts.

When we go to the real world and see how people play the ultimatum game, 99/1 is almost never an equilibrium. He would be so incredibly pissed off with me that he is more likely —— I think that is —— we are humans —— to say "no" and both of us would get zero.

Now, you would say, but Apple is not the usual human playing ultimatum games. Well, again, think about the implication for Apple to resist in terms of its future and in terms of the reputation that it generates with

other companies with whom it is negotiating, but also think that the vast amount of bargaining analysis is not done by economists, but is done in business schools and the sort of logic that is applied is not sum game perfect equilibrium à la Nash, but is more the sort of logic that I am referring to and, as you can see, when you go to any bookstore and find books about negotiation, "Getting to 'yes'", "Learning to say 'no'", "Negotiators never split the difference", there are many titles that you will see there.

So I think that those are the limitations in this modelling and logic that Mr Noble applies.
MR RIDYARD: To explore that a little bit. You are saying that even if the —— because Mr Noble's sort of —— his story —— we will get into the theory maybe in a minute, but the short story around it is if you make the cost of going to FRAND high enough, then it will not be attractive to go to FRAND arbitration and instead you will accept, you know, a higher royalty rate than you would have expected, had you gone to FRAND. I mean, that proposition, I mean, is at some level is that reasonable?
DR PADILLA: It is not unreasonable. I agree that if I increase the cost to go to litigation, you are less likely to go to litigation, but the question is: would

you go to litigation or not? Is the effect so determinative? So if I threaten you, the first thing is you are not going to be comfortable. Now, are you going to change your conduct? That depends on the first —— whether you consider the threat credible. Second, whether you think that you can counter that threat. Third, you are going to consider whether being blackmailed in this particular way, if you accept, is going to have long—term consequences with that counterparty and with other counterparties.

So all that I am saying is that from theory to practice there is a long step and we need to check, not only whether there is dominance and indispensability, but also we need to check whether all those other steps are there and the reason is, first, because the relationship between Qualcomm and Apple or Qualcomm and Samsung is not static, it is dynamic, because these companies interact with many others and so on and so forth.
MR RIDYARD: I suppose in one way what we are —— why we are asking these questions is we —— is whether we get to the answer —— and I think we understand the problem, as it were, but whether we get to the answer to that problem by looking more carefully at the facts or by going through the theory in detail and maybe you are going to

say we should be doing both and I guess we probably have to do both, but I just wondered whether —— I mean, Mr Noble, maybe you could respond, whether you have a view on whether this is —— the difference between you is really about the facts and the parameters, as it were, of the model or the theory?

MR NOBLE: I think there are differences on both. I mean, I guess you know we are not the fact—finders. I think a lot of the debate has been about facts, but if we put that to one side, I think obviously if we are given the same facts, then I think we are closer than we otherwise would be.

I do detect though that Dr Padilla and I are still not aligned on the value that these bargaining models can provide and, I mean, the example he gave I think is actually quite an extreme example of a bargaining game and I do not think it really fits the facts of this case because those, take it or leave it one—shot games, they do not, I think, represent what we see in these negotiations. We see something where, you know, we have seen lots of evidence, these negotiations take one or two years. There are offers from both sides. There is movement on both sides.

So I think it is much better to sort of appeal to the broader range of bargaining theory, you know, Nash

equilibrium. There is lots of literature that we both cite that speaks to that and what you find in that literature is generally that both sides' outside options influence the outcome in those kinds of bargains.

Now, I think it is right that what we are talking about there is bargaining theory. Bargaining theory inherently cannot tell you for sure that this specific bargain is definitely going to be impacted by these elements, because it will not capture all of the necessary features of that specific negotiation. There may be human factors, you know, whether I am irritated by Dr Padilla's £1 or not, things like that that they can and they may well do influence the final actual outcome. So —— but I do not think that means that the theory does not help you, because I think the theory does help you understand whether it is likely or not that something is going to have an impact and, if that is the test, then I would say that the bargaining model does assist the Tribunal and going through that theory does assist the Tribunal in answering whether it is likely or not, but I think, you know, as my understanding is, this whole case has been divided in two, because then there is a second half that would then look at, well, okay, in fact did this specific outcome in this specific bargain have a specific effect?

THE CHAIR: If that is the case, then I am just still struggling with what insights we get from all the fancy economics, to put it bluntly. I mean, you have a sort of economic model which you elaborate on, but if ultimately you come down to the question of what are the actual facts, what are the —— what are the psychologies of the parties, what was said in the interchange between them, I think this is Dr Padilla's ultimate position, then you say your bargaining model just tells you what is likely, but ultimately you then have to still revert to what are the facts.

MR NOBLE: I do agree that the facts matter. I mean, I guess it is worth noting that the bargaining model was in fact Qualcomm's idea. You know, it came from them, their methodology statement, and, you know, I read that methodology statement and thought it was a very good idea and that is one of the reasons why I spent so much time and energy developing it.

The other reason is I think that it is —— the bargaining model helps you understand some of the —— the relevance or non—relevance of some of the different submissions that have been made. So, for example, I do understand there is a debate about whether or not explicit threats are needed or not and the bargaining model helps you understand that is not a necessary

requirement. So I do think the bargaining model can help you understand whether or not you need to see explicit threats, for example.

MR TURNER: But is not Dr Padilla sort of taking a Yogi Bear—er approach, which is in theory there is no difference between theory and practice but in practice there is, so he is reminding us of the limitations of the Nash equilibrium and the realities of the world and says deals are done by businessmen, they are not done by mathematicians, which is obviously correct, but insofar as we get assistance from the mathematical model or the model you are putting forward, it is just showing us ——

So there is that debate to have, whether the real world works in accordance with models, but there is a separate question actually whether the model itself is giving us any information that is not self—evident, i.e. that if you threaten someone to potentially destroy their business, they are going to look at that threat very, very seriously and they may end up paying you a higher royalty.

MR NOBLE: Yes.

MR TURNER: As I say, if those are the facts, and of course there is absolutely no agreement and we have not formed that view at this stage, of course, but if those are the facts, then the mathematical model is just telling us

something that is self—evident if you want to analyse it in that way.
MR NOBLE: Yes.
MR TURNER: Whether that applies in the real world for the reasons Dr Padilla is indicating is of course a secondary question.
MR NOBLE: Yes. I think —— I do not think you have to use the model I think is the short answer. I think the point of the model is to try and help. If the model does not help, then you can put it to one side and I think you can decide the case, in a sense, in the narrative way. I do not —— yes, so —— but the purpose of the model and the reason economists have spent so many decades working on bargaining models is to try and understand how these complex interactions operate and to try and provide sort of further insights on them, but ultimately, you know, that —— all of that needs to be seen in the context of the specific —— and the specifics of the case.
THE CHAIR: That is very helpful. Thank you.
DR PADILLA: If I may, the way that Mr Noble is presenting the literature is a little bit simplistic, to tell you the truth. Yesterday night in preparation for today, looking at the agenda, I was again researching the bargaining literature to try to see whether or not the

outside option principle, that outside option that changes in the outside option, makes a difference whole whole and under which conditions. There are plenty of papers with some of them tellings you which conditions the outside —— changes in the outside option will have an impact in the bargaining outcome and many, many papers that tell you about conditions in which that is not going to happen.

So eventually you need to go to the facts. In addition, my problem with Mr Noble's model is in addition is that the model is biased. The model is saying: in the counterfactual, what Apple is going to do is Apple is going to go and seek a FRAND determination. How do we know that? It could well engage in holdout and wait and wait. If that is the case, you know, then the result is different. It could actually purchase the chipsets and claim exhaustion. I am not an expert in exhaustion, but, if it does, then, again, the counterfactual is different. The model is biased because it takes into account the impact of the threat on Apple, but the threat does not come free —— for free. It has a cost. If Qualcomm refuses to sell chipsets, there are many volumes that are lost.
MR TURNER: That is a slightly separate question. We are making the assumption that Apple is —— that Qualcomm is

making that threat.
DR PADILLA: Correct. I can leave that aside.
MR TURNER: Let us for present purposes make the assumption it means it. It is not an empty threat.
DR PADILLA: So why —— and indeed I think that Mr Noble is absolutely right that initially I thought that we could deal with this through modelling and the reason why I did not do modelling in the end is because I came to the conclusion that I had so many degrees of freedom that I could almost create any story that would fit anything.

The problem is that, as usual the counterfactual is not observable, plus in this case we have another problem, which is that we have an exploitative case with no corpse; the corpse may be found in the second trial but there is no corpse now.

So we have a problem with the factual because we do not have a corpse and we have a problem with the counterfactual, the usual problem is very difficult to predict. So what I thought then is to assist the Tribunal, instead of removing the contested conduct, the NLNC or chipset supply practice, let us try to proxy the counterfactual in a different way and that is the empirical work. Empirical work that it tries to do is say: well, if what is problematic is dependency, let us

try to see what happens when there is no dependency.
THE CHAIR: Okay. We will come on to that.
DR PADILLA: But it is to explain the alternative way of modelling the counterfactual.
MR RIDYARD: Maybe, as we are on the counterfactual, it might just be helpful, Mr Noble, if you could just briefly summarise your counterfactual. The counterfactual you have in paragraph 6.65 of your eighth report, you say one alternative could be for Qualcomm and the OEMs to sign a licence specifying that, absent an agreement over royalties, the appropriate rate would be subject to a third—party determination of the appropriate rate. So if they could not agree a licence, they go to FRAND.

In that, do you mean both sides would commit to just accepting whatever turns out from the FRAND process?
MR NOBLE: So maybe if I just step back and then I will be certain to answer that part.
MR RIDYARD: Yes.
MR NOBLE: So the way I have approached the counterfactual and thinking about how to build the bargaining model and the whole framework is that what we want to remove is the allegedly offending conduct, the NLNC and the RTL, and so it is, in a sense, the counterfactual is characterised by in a sense non—conditioning. That's

the critical assumption that the royalty agreement, the royalty rate is not conditioned or affected by the supply or non-supply of chipsets. They are separate conversations.

MR RIDYARD: You want Qualcomm to behave as if Qualcomm -- the chipset company arm to behave as if it does not have a licensing arm as well?

MR NOBLE: Well, that is one way to think of it that it is a sort of structural separation or something like that that, in a sense, these are two separate conversations and they are independent and they are not jointly profit maximising. They are individually profit maximising in those two conversations.

Now, there is a debate about patent exhaustion and about whether that means that, in the special case of Qualcomm, where you have these two businesses, that these sort of two separate conversations do not work. I do not know the answer to that. That's a question about patent law and exhaustion, but assuming that that is a good answer, that means that there is some rationale for why you might be allowed to link the two, then, in a sense, that is when 6.65 kicks in because that then says: well, even in that circumstance, then there is still a way to separate or at least give people the option that they can separate these conversations.

MR RIDYARD: Okay. Can you just clarify where -- in terms of your counterfactual, where we are on the -- because you mentioned RTL there as well in your description, where we are on chipset licensing? Is chipset -- do you think that Qualcomm needs to be offering chipset licensing, or is it okay for Qualcomm to carry on doing end-device licensing?

MR NOBLE: That is a part I am more agnostic about on the economics because, in a sense, if RTL is problematic for the reasons set out by the Class Representative, there is a requirement that Qualcomm should have been doing it, then obviously that needs to be different in the counterfactual, but I think this goes to the buttressing conversation we had yesterday, that in a sense the primary reason that I think about RTL is because of this bypass route. If that bypass route does not exist, then it does not exist.

MR RIDYARD: We covered that yesterday, yes.

MR NOBLE: Exactly. So, in a sense, there is no difference between the factual and the counterfactual if it does not exist anyway.

DR PADILLA: May I make two comments on this?

So the first comment is the reason that my understanding is that Qualcomm's argument for its chipset supply practice is precisely exhaustion. So

what Mr Noble is saying is if we remove exhaustion from the picture, then Qualcomm would not need the chipset supply practice. That is for Qualcomm to decide, but it seems that that may be the case. That is precisely the reason, this patent exhaustion is at the core of this issue and it does not resolve -- we do not know whether this counterfactual is, you know, better or worse than the factual from a competition and efficiency perspective. So exhaustion cannot be ignored.

My second comment with this counterfactual, and in general with the analysis of Mr Noble, is that he ignores what is going to happen with chipset prices. So suppose that the royalties as a result of this, in this counterfactual, went down. Then we are working under the assumption that Qualcomm is dominant -- not only dominant, but Apple really needs those chipsets. I would expect chipset prices to go up and we are back to the discussion that we had yesterday.

If Mr Noble now tells me, "No, they cannot go up because entry will be immediately kicked in", then we have a problem because if entry is at the gate --

MR RIDYARD: I think Mr Noble did try to finesse that by saying there was some power to raise prices.

MR NOBLE: Yes. I think the other point to bear in mind is what we are talking about here is a damages claim that

relates to purchases in the UK and they do not have phones and Qualcomm has been at pains to point that out every time that phones that are sold in the UK are almost universally UMTS compatible and not CDMA compatible and, in a sense, a lot of the conversation is about how much market power they have in CDMA and if they have lots of market power in CDMA and we talked about the CDMA adder yesterday, then one would expect that the first round effect is if they have market power there that they are not exploiting, they might seek to exploit it there, but the first-round effect of that would not obviously be on UK consumers, it would be on US consumers, because they are the ones that are purchasing CDMA phones.

MR RIDYARD: But we are looking -- obviously it is a global negotiation, but we are looking at what the outcome of that negotiation is.

MR NOBLE: Yes.

MR RIDYARD: Okay. I need to think more about that.

MR NOBLE: Yes, the other part to think about in that is also the dynamics, the time periods, because of course if Qualcomm has the market power and puts the prices up, I think the conversation we had yesterday about barriers to entry is that it does not mean you simply get rid of them; it is that you create a stronger

incentive to jump over them. So if people could jump over them eventually, they might jump over them a bit sooner than otherwise they might have done and, again, that feeds into the time periods that we are looking at in this case.

THE CHAIR: Can I just tease out, leading on from that discussion about what your counterfactual is, Mr Noble, do you understand your counterfactual to be the same as that articulated by Mr Moser for the Class Representative? So if I just take that from Which?'s further Note on Negotiation which —— do you have that?

MR NOBLE: I do not have it in hard copy.

THE CHAIR: Can that just go up on the screen. So we are in open session so I am not sure if there is a version which has appropriate redactions or whether the redactions are going to be visible to anyone who should not be seeing them, but I am looking at —— I do not need to see a confidential version —— paragraph 3. Maybe I can just read it out.

MR MOSER: Would it help if I give the page reference?

THE CHAIR: If there is one, yes.

MR MOSER: EAOX/3/2.

THE CHAIR: "As the Tribunal's letter of 9 October 2025 correctly identifies, and as lead counsel for Which? explained in opening submissions, the counterfactual in

the present case is one in which the abusive conduct described in paragraph 1 is absent and, in consequence, OEMs were able to challenge Qualcomm's SEP royalty rate, (including through a FRAND negotiation and litigation process), without risking the loss of their supply of chipsets from Qualcomm."

The point is then made in summary that the OEM would not necessarily have had to have litigation, but the ability to do so without the risk of disruption to supply and in the absence of comparator rates tainted by Qualcomm's conduct would have improved the bargaining position and likely reduced the rate payable.

So, in essence, what is described is the ability to challenge the royalty rate, even if you did not exercise it. So the ability to challenge and knowing that you could challenge that without risking the loss of supply of chipsets.

Is that a correct articulation of your position?

MR NOBLE: Yes.

THE CHAIR: It is?

MR NOBLE: Yes.

THE CHAIR: So it is one and the same counterfactual?

MR NOBLE: Yes.

THE CHAIR: That is very helpful. Thank you.

MR RIDYARD: Okay. Let us move on to the bargaining model

framework. I think, just based on the previous and the prior discussion, we have seen that both of you have said in the joint report where you go through a number of the theoretical points in some detail and, I mean, I think there is a question mark about how productive it would be to rehearse that, given what both of you have just said. I mean, I think really understanding the narrative and the facts around it may well be more useful for us, but I think, nevertheless, it would be helpful if I could just ask you to give the brief version of what is it between you —— what are the key points between you on the theory —— on the bargaining model theory, the sort of three—minute version, as it were.

MR NOBLE: That's part ——

MR RIDYARD: I would just like you to summarise what you —— you know, in brief, what you think the key areas of battle are between you and Dr Padilla on the bargaining model theory itself, before we get into some of the facts.

MR NOBLE: I think there is only one, which is —— but that Dr Padilla will no doubt correct me ——

DR PADILLA: I will.

MR NOBLE: Well, maybe the main one is the link between outside options and the bargaining outcome. That is

certainly a significant difference between us.

MR RIDYARD: That is a short answer.

DR PADILLA: Yes, so I will expand a little bit, although I think by and large Mr Noble is correct.

I think that —— so areas of agreement. Areas of agreement are that the conduct at issue may affect the licensee's outside option. The disagreement there is that I say, in certain circumstances, you need to check the facts and my interpretation of Mr Noble is he says it does in all circumstances.

Then there is an agreement that changing the outside option may affect the bargaining outcome. The disagreement is I say in certain circumstances you need to check the facts, and Mr Noble tends to say almost always.

So to confirm —— or to make the disagreements a little bit more clear. My position is that whereas the threat could change the outside option available to Apple, whether it does or not depends on circumstances, such as is the threat credible or not, how is Apple responding to that threat in the context in which it is negotiating multiple rounds and with multiple people?

When we look at the change in the outside option implied by the threat, another difference is that I consider that that has an impact on Qualcomm and

I believe, Mr Noble, that your model does not take into account the impact on Qualcomm, which, you know, has a relationship with the credibility of the threat, but, even if you think that the threat is credible and you use the Nash bargaining framework, basically there is a change in both outside options simultaneously.

Then there are disagreements about whether the factual assumptions are correct or not, whether this model applies to the Apple situation or the Samsung situation on the facts.

Finally, there is a disagreement as to whether any change in the royalty agreed would have an impact on chipset prices or not. My view is that Mr Noble's model abstract from what would happen in the chipset dimension if there was a change in royalties.

I think that, by and large, these are the areas of disagreement.

MR RIDYARD: Mr Noble.

MR NOBLE: So I think there are three that Dr Padilla has just outlined, so maybe if I just summarise them to make sure I have correctly ingested them.

The first one is there are disagreements between us on the facts, which ultimately the Tribunal will decide whether or not the facts marry up with the bargaining model and so on and our case as a whole. So that is one

group.

I think the second group is the point that I raised, which is then around the, in a sense, what one might think of as the strength of the linkage of how likely is it that that bargaining model can tell you something useful about whether the options are more likely than not to impact the outcome or otherwise.

I think the third one is then this point about this —— I think it is reverse leveraging that Dr Padilla was referring to, the idea that Qualcomm loses lots of chipset sales. Is that the point?

DR PADILLA: Yes. The question is that this is not a chip threat.

MR NOBLE: Well ——

DR PADILLA: It is not like hiring somebody to shoot you down which costs, but not that much.

MR NOBLE: But I think that is a crucial part of the bargaining model so I do not think it is correct to say that the model does not look at that. It does look at that and that is the whole notion of recapture and that is the very important part of the logic of this, which is that —— consider CDMA chipsets, particularly in the period when Qualcomm was the only game in town, that the logic of the model is to say that if Qualcomm —— the threat is credible because Qualcomm cannot sell to Apple

or Samsung or whomever and can be assured that it will get most, maybe not all, but a good portion of those sales back because not —— essentially if Apple is not selling a phone on Verizon or Samsung is not selling a phone on Verizon, then somebody else will and therefore that means, in a sense, they can recapture them because, in a sense, if you have 100% market share, then they are the only people that could make this chipset that will go into a phone that will work on the Verizon network.

MR RIDYARD: You are assuming there is a kind of zero sum game there and if Apple stopped making phones, someone else would?

MR NOBLE: Well, it is not —— the model does not require zero sum.

MR RIDYARD: No, but a substantial mitigation of the cost.

MR NOBLE: Yes, the model needs there to be material levels of recapture so that that attenuates this threat. So essentially it makes the reverse leverage argument not very credible. It may have some impact, but it will not have a lot of impact because if Apple does not buy those chipsets, somebody else does is essentially the logic.

MR RIDYARD: Effectively, the scenario is Apple stops making —— is stopped from making phones by Qualcomm carrying out ——

MR NOBLE: Precisely. So that 30 million phones that we talked about in 2015, the kind of scenario I have in mind there is, well, Qualcomm refused to give 30 million chipsets to Apple. That means it cannot sell those 30 million phones on Verizon and the other CDMA networks, but there are still those on those networks because they account for about 50% of the market in the US and so those people may have switched to an Android phone or some other handset and that means Samsung would have —— sorry, Qualcomm would have still made most of those sales.

MR RIDYARD: You have not carried out any sort of analysis of that; it is —— I mean, it is an argument of logic?

MR NOBLE: Yes, it is an argument of logic.

THE CHAIR: I think that is the point we discussed yesterday, was it not, about empirical analysis of the trade—offs, when we were talking about CDMA?

MR NOBLE: Yes, but I think you can do some quick maths to essentially work out that the sort of relative scale of overcharge that is alleged in this case is relatively small relative to the kinds of profit loss that OEMs might suffer.

MR RIDYARD: I mean, I know you have views on that.

DR PADILLA: I did not quite get the last point, but with respect to the previous ones I think that, you know, we

need to be precise, because otherwise I think that, you know, there are a number of jumps here that are difficult to understand.

CDMA represents very small volumes for Apple. It is not —— it was mentioned like 50% of the market. No, we are talking about very small volumes. It is even unclear to me, for the reasons that we discussed yesterday, that the threat with respect to CDMA would have an impact in any way on the conduct of Apple. If you tell me the threat concerns UMTS, then I can see that that would carry much more weight, but if it is UMTS and Apple stops selling UMTS phones, who is going to replace Apple? When is that somebody going to replace Apple? At which chipset prices, by the way? Because Qualcomm now realises that, you know, it has different options. All that requires a lot of analysis. In principle, the direct effect of the threat is that you are losing the volume from Apple and from Samsung and then you have to hope that somebody is going to come and replace and the consumers are going to be willing to buy instead of waiting to see what happens next year.

Also, you are also missing the point that of course Apple and Samsung are not going to sit idle. If we bring the dimension in time, then we need to factor in that those guys will then sponsor entrants in those

areas, especially in UMTS, and they will then find alternatives.

So all that needs to be factored in and modelled and it cannot be presumed. I mean, we are talking about a serious allegation of abuse.

MR RIDYARD: Yes, I think that is as far as it is useful to take that particular point.

Sorry, let me just get my notes back in order.

MR TURNER: Can I just ask a question? Mr Noble, in your model you consider the prospect of litigation, you talk about FRAND litigation, you consider it is relevant whether it is an option or not, you consider the costs of it. You do not, however, contemplate antitrust litigation. I was a little unclear why your model dealt with FRAND litigation, but does not deal with antitrust litigation. This would be on the assumption that at all times a company the size of Qualcomm is taking legal advice and will be appreciating that there may or may not be a risk associated with withdrawing chips from the market.

Why are you including FRAND litigation and the risks of FRAND litigation but not including the risks of antitrust litigation and the consequences of that?

MR NOBLE: It is a good question. I mean, I think, in essence, this is an example of the antitrust litigation.

I think there is a fundamental question that we are trying to answer which is: you know, do they have a dominant position and have they breached the antitrust rules? I think in a way it is almost to try and endogenise the case that you are answering in the model you have used to answer the case, I have struggled with how I would do that. This model is already complicated.

MR TURNER: If one is trying to model these things, if Qualcomm is saying it would be a really cool idea to withdraw chips because they will have to pay us more royalties, and it has a whole legal team going, "whoa whoa whoa, just be cautious" I mean that is a factor in how the negotiations would proceed. I do not know what the answer to any of that legal advice would be, but just ignoring —— it just seems difficult. I think Dr Padilla made a reference to this in one of the answers he gave earlier.

MR NOBLE: Well, I mean, I guess, for me as an economist it is difficult to sort of include the case that I am trying to answer in the analysis I think. I struggle with how I would do that.

DR PADILLA: So if I may, I think that that goes —— I think that the point is important and it goes in or has two effects. One is the risk of antitrust litigation could have an effect on Qualcomm's conduct, but it is also

going to have an effect on whether or not Apple considers the threat credible. I think that, you know, this fact is not going to allow us to understand exactly the motivation behind, but we know actually that when Apple sued and instructed its CMs not to pay, there was no disruption of supply.

Now, that does not say much in terms of the theory, but I think that what is important is to understand that the threat has to be credible and there are a number of reasons why it may not be credible, especially when you have a large counterparty.

THE CHAIR: Can I ask a slightly different question about the bargaining model. So, as I understand it, the royalty effect on SEPs that is predicted by your bargaining model, Mr Noble, that ultimately emanates from chipset dominance and the leveraging theory that you employ to describe the interaction between the chipset market and the SEP market.

Should that or could that simply be characterised as a straightforward monopoly chipset pricing effect, if you like, or, in other words, excessive pricing on the SEP market but arising from the interaction between the chipset and the SEP market?

MR NOBLE: Well, I think this goes to the conversation we had yesterday about the barriers to entry, that for me,

as an economist, the logic of why you apply different tests in an exclusionary versus an exploitative abuse that is in the market —— that you have market power in and, you know, the various tests that are used for excessive pricing, for example, is because of this expectation that there is a self—correcting feature in most markets.

I mean people like JK Galbraith and many other economists have talked about this. The nature of markets are that they do tend to self—correct in lots of circumstances and so the —— in a sense, I think that is why one wants to apply quite a high hurdle to saying that in a specific market there is excessive pricing and exploitative conduct. In this context, I think there is an important difference, which is that the rent, as we talked about yesterday, is being taken in a different market where there are these statutory barriers to entry.

MR RIDYARD: But this is still an exploitative theory, is it not?

MR NOBLE: Well, yes, they are exploiting the vulnerability of their counterparty, yes. That is the primary logic of this case.

MR RIDYARD: It results in high prices.

MR NOBLE: Yes.

MR RIDYARD: All the kinds of creative destruction—type arguments, do they not just apply —— I mean, do they not just apply just as much to this theory of harm as a pure sort of vanilla excessive pricing case?

MR NOBLE: I do not think so because of the nature of the statutory barrier to entry. I think that for me is —— draws a sharp distinction between the two.

THE CHAIR: All right. Let me posit something else. Supposing you did not have the FRAND framework and you have a situation where you have a monopoly in the SEP market and a monopolist then charges an excessive price. You would analyse that under the standard excessive pricing framework. In that —— just straightforward SEP monopolist, you have a load of SEP patents, you have 100%, everyone needs them, so you charge an excessive price. You would analyse that under excessive pricing, I assume.

DR PADILLA: I would agree.

THE CHAIR: You would.

Mr Noble, I am struggling why you do not accept the proposition.

MR NOBLE: The reason I am pausing is —— I mean, I think there is a case to do that, yes. I certainly agree with that, if there is a case. If there is not a regulatory solution in the way that you have with the FRAND regime,

then I think there is a case to, in a sense, treat it, because the market power is in the SEP market. It is seeking to take the rent in the SEP market.

THE CHAIR: I am not talking about this situation. I am just starting ——

MR NOBLE: In theory, yes.

THE CHAIR: In a vanilla situation, you have a monopoly in the SEP market. Let us say you do not have FRAND. The monopolist charges an excessive price. You analyse that. In this court you would analyse it as an excessive pricing case.

The situation we have here is a variant of that. What is being said is you do have the FRAND safety valve, but the chipset dominance, you say, disables that safety valve. So is that not exactly the same as the situation I have just described where you do not have the safety valve at all? All you are describing is a situation in which the safety valve has moved away so you are back into the situation where you simply have an unconstrained monopolist who is charging, you say, an excessive price.

I do not understand the difference between this situation on your theory and the hypothetical situation I have just described.

MR NOBLE: But I think there are two versions —— well,

rather, there is a threshold question there, which is: is the act of disablement of the safety valve in itself problematic because, if it is, then in a sense the outcome you are getting in the SEP market is fundamentally different or at least on its face has the potential to be fundamentally different than the one that you would otherwise have.

MR RIDYARD: You could say the same about if I am just a non—practising entity, I happen to own some SEPs and I charge $30 for something that ought to cost only $10, I mean, that act of charging $30 is different from what would otherwise happen.

MR NOBLE: But what that non—practising entity has not done is taken steps to disable the ability of the counterparty to access the safety valve.

MR RIDYARD: I know, but that is the point, is it not? It is the same evil we are looking at in both cases so why should it be assessed against different criteria?

MR NOBLE: But I think it depends what you think the evil is. Is the evil the price or is the evil the disablement of the FRAND safety valve?

MR RIDYARD: Well, it does not matter if you disable the FRAND safety valve, if it has no effect on price, does it?

MR NOBLE: But I think if you think that it had —— well,

I mean, this comes into the debate about whether if it is within the FRAND range —— let us assume that in this scenario it is above the FRAND range. Then I think you do have a different situation. You have a situation where it is clear that the disablement of the safety valve has had an effect, in that the amount more than that is the effect of that.

THE CHAIR: But why would you judge the two differently? I am also like Mr Ridyard struggling to understand why the conceptual framework for the assessment of the abuse is different where in one case you look at whether the price is excessive and in the other case when, again, the ultimate evil is the charging of the excessive price through the ability to do that, through disabling the valve, why do you not also look at whether the price is excessive on the standard test of excessive pricing?

MR NOBLE: I think you could do that. I think there is a question about whether you need to do that and I think the distinction that I am seeking to draw is that, that the difference is that there is that threshold question.

One could take the view that you also need to do that, but at some level that starts to become a question of law and policy.

MR TURNER: What happens if Qualcomm says: right, we do not want a FRAND determination. They are expensive. They

take too long. We do not like them. All our agreements get paraded around in court and it is all very unpleasant. So we will give you a 20% reduction off what we consider the FRAND rate, just to get rid of this matter. So they have disabled the FRAND valve, but they have actually reduced the price. Would that be —— how would that end up in your analysis?

MR NOBLE: But I think my answer to that would be it is not obvious that they have disabled the FRAND safety valve. The safety valve remains active, because I, as the OEM, could, if I did not like that number, activate the safety valve. It is just I have been given a very attractive royalty rate and so I might accept it and therefore not activate the safety a valve.

THE CHAIR: I think we should give Dr Padilla a chance to come back on that whole discussion.

DR PADILLA: Let me say to start by saying that I agree that ultimately you need to prove the evil and therefore to show excessiveness.

I understand what Mr Noble is saying, like if the action disables the FRAND commitment, that is distortion of the competitive process. That is not competition on the merits, but, still , that is only one of the two legs. Even in an exclusionary case, that is only one of the two legs in order to prove an abuse. You still need

to show that that departure from competition on the merits generates an evil , which means that eventually you need to prove that the resulting prices are going to be excessive.

I am not a lawyer, but I believe that that is consistent with the case law.

MR RIDYARD: Okay.

THE CHAIR: Thank you.

MR RIDYARD: That is helpful.

I am going to go back to the model and its workings. I was going to say "predictions". What I am interested in is whether there are some predictions from the model. It seems to me that obviously the thinking behind the model, Mr Noble, is that, you know, this —— or the outside positions of various parties to these various possible negotiations fluctuate over time, depending on circumstances. So —— and we —— and we know in the case of, take Apple, you know, there was a period when they were not dependent on Qualcomm and periods when in your view they were.

So —— and, equally, there are differences between one OEM and another for various reasons.

I am interested in knowing whether those differences should throw up different predictions from your model and whether —— what can we do to use that fact to assess

the model's ability to explain the world?

MR NOBLE: Yes. So, I mean, I think you said in the agenda it was about what sort of testable propositions that it might throw up.

MR RIDYARD: If you like.

MR NOBLE: So I think the first one I touched on earlier, which is this question about what one might expect to see from —— in the evidence and is it important, is it necessary on the logic of this model to see explicit threats? I think that is quite a useful insight , in that the model says you do not need to see explicit threats. As long as all the players of the game, the parties , understand the consequences of the actions, then they ——

MR RIDYARD: Okay. That is kind of a nice argument or clever argument, you might even say, but it means that we cannot tell by looking at things whether it is happening or not. I want to know what testable propositions arise from the model.

MR NOBLE: Yes. So I think this —— the one you were alluding to, so the second one is then this point about the —— well, sorry, before I move off that first point, there is the converse of that, that I do think a testable proposition is you should see evidence of parties understanding and considering the credibility of

the threats from the other parties in ——
MR RIDYARD: That is very hard to observe too, is it not, because all sorts of positions are taken in negotiations?
MR NOBLE: Yes, although we do have the luxury here of seeing behind the veils of those because we see inside of one company, inside of another and the interactions so I think that ——
MR RIDYARD: Okay. I will look obviously at all the evidence.
MR NOBLE: I think the next point is then this point about equilibrium shift as you refer to. It is essentially do you sort of move the legs of the bargaining model and I think, for me, the Apple litigation, the whole swathe of litigation, is consistent with the model because at the moment that it felt possible —— that these outside options, in a sense, the pay—offs in those boxes had switched around, it then moved and it took the action to try and seek a FRAND determination. It tried lots of other things too. Whether or not they are legitimate is sort of to one side, but they acted upon the incentives as outlined in the bargaining model. That is my proposition, that it is consistent with the model and of course one can then consider the model and the facts and see, well, do we consider that their behaviour fits the

kind of predictions that this model makes or does it not?
So I think that is a testable proposition.
MR RIDYARD: But if that had resulted in a 30% reduction in royalty rates in 2018, that would have been a nice box to tick in your case, but it did not so we are still —— I mean, I understand what you are saying, but we are still sort of frustrated without having a test.
So are there any other places to look at? Should we be expecting any other OEMs to have achieved some benefit or some reduction in royalties, because that is what this is all about, is it not, ultimately?
MR NOBLE: Yes. I think, frustratingly, I do not think the model gives you those kinds of predictions beyond that.
The third one, which you may or may not like, is the point about the court rates because the model also makes an assumption about the fact that there is the indirect effect that because you have a lot of agreements that you have —— on the theory of harm —— leveraged and therefore achieved higher rates, that you might then affect the attractiveness of the outside option itself, even if you do feel able to forego the chipsets.
So if that is right, you should expect to see that the players of the game are concerned about that and took that into account when they were considering

whether or not to go down arbitration, litigation, etc, routes and, again, I do think you do see evidence of that.
(Redacted — confidential information)
MR NOBLE: No, and I think that links back almost to what is the status of the model as a whole. It is a mathematical version of the narrative theory of harm and the benefit of those mathematical versions is that it helps you test the robustness of a theory of harm and then, potentially, pull out ——
MR RIDYARD: That is not entirely right, because I might have a theory that cartels raise prices, quite plausible, good sort of economics behind that, but I then also might go out and say here is a cartel and it happened between these two years and in these two years prices were higher and that makes it more impressive, you know, my theory.
MR NOBLE: But to continue the example, the status, I think, of the bargaining model is that you think and you write "cartels raise prices" and then you write down "here is how they do it". The bargaining model is a bit like doing a mathematical version of the interaction of the different entities in the cartel and considering, well, it is plausible that they would find it attractive to do this and the kind of testable proposition you then get

out is, well, we then need to go and test empirically is the price higher than it otherwise would have been and that is what cartel overcharge analysis is doing.
DR PADILLA: If I may, I think there is a testable proposition emerging from the model, which is if the counterparty, if the implementer is not exposed to the threat, then there should be —— they should be paying lower royalties. So I think that what the model tells us is that there is a threat and that the threat is the discontinuations of supply. If you do not depend on that supply, then your royalty should be lower, according to the model and the more dependent you are, the higher the royalty should be.
So I think that that is, as far as I can see, the only testable proposition.
MR RIDYARD: Which is —— well, we will come on to that in another section. That is what you have sought to do with your leverage analysis of course.
I just want to jump back to something which is, I am afraid, completely out of context but I have just been thinking about it in the background. Dr Padilla, your example of the ultimatum game, I just want to clarify what I think is a very small point on that. When you explained the ultimatum game, if that —— when that is done as a sort of one—off experiment with college

students, or whoever, they ought to accept the $1, but they do not and that is the kind of behaviour —— characterised as a sort of behavioural bias, these people are acting irrationally, but if —— but when you went on to explain the relevance of that to the case, I think you were saying that it is not that you were expecting Apple to be irrational here, it is that it is not a one—off game, there are reputational effects and you made some other points about other considerations in the real context Apple would take into account before —— and therefore be more rational, as it were, in rejecting the $1 offer.

So your way of looking at this thing is you are not positing irrational behaviour by the parties; you are positing that it could be perfectly rational for Apple to say "no" to the $1 because of the further consequences?

DR PADILLA: Right. This is very much my —— let me put it that way. I think that as an economist I am always very nervous about explaining things on the basis of irrationality, because irrationality can help you explain almost everything. At the same time, I recognise that most of the bargaining literature comes from business schools and it actually is based on heuristics, biases, etc and I cannot rule out that some

of the Silicon Valley moguls have funny psychologies. So I am always looking for a rational explanation.

When economists have looked at the ultimatum game and those that are not satisfied with the irrationality explanation, they have said: okay, why is it that people are behaving in this particular way? Is there a rational explanation? Typically, it is repeated games, it is that this kind of behaviour tries to enforce co—operation going forward or good behaviour on the part of the other player and that is what I extrapolated to the case of Apple.

MR RIDYARD: Yes, okay. I do not want to go any further on that, but that was something in the back of my mind.

There was one other specific question I wanted to ask and that was —— in some ways, it is related to that ultimatum game illustration. Can you just help me, Mr Noble, just to take us through briefly the —— your take on this Nash equilibrium point, about if there is a bargaining model where there is some rent, as it were, between the two parties, I mean, how in your model —— can you just summarise how in your model how that resolution is made, what the outcome is when you have this situation such as, you know, in principle both parties might be satisfied either with $1 or $99 but where that ends up?

MR NOBLE: So the bargaining model that I have tried to build is I have tried not to be conditional on one specific equilibrium concept because I think Dr Padilla is right that there is a lot of debate in the economic literature about which of the range of equilibrium concepts is most useful in which contexts. So what I have tried to do is to present a model that is consistent with, in a sense, the majority of these models, that they show you that both sides' outside options matter and I used the term "outside option" in a broad sense. Some of the literature uses it in quite a narrow sense. I am using it in a broad sense to capture things like discount rates; the fact that the longer you take to reach an agreement, the more costly it is for both parties. What you find in the literature is that outcome, there is then a possible agreement, the Nash equilibrium, depending which model you are talking about, they use different language, is influenced by both of those outcomes essentially and it is influenced because each party, they may not have perfect information, but they have some information about the quality and the realism of those outside options and that causes them to adjust their own position and it is particularly relevant in these contexts where you are talking here about parties that are even within the same

negotiation trading information. They are gradually moving towards each other sometimes or they are articulating more clearly what their position is so that the other party can understand it and the rationalisation of that is that that is parties trying to narrow the gap between them. That is essentially the bargaining model in real life, people homing in on a final outcome.

DR PADILLA: My point is the point that I made before. I think that the literature says "may" in certain circumstances. So let me illustrate this.

Let us suppose that Spain's Prime Minister, who is our Prime Minister who is not in a good relationship with President Trump, says, "Look, I have acquired a new couple of drones, the US should surrender". Okay, the fact that now we have two drones that we did not have before has strengthened our position, definitely. Do you think that President Trump is going to move? No. It depends on lots of things and I think that we agree that the threat can move things in one direction —— may move things in one direction and there are a number of assumptions, but does it move things? That's the question. That is why the model is not helping us and that is why we need to look at testable propositions and engage in factual analysis.

MR TURNER: In this example, has your Prime Minister read "The Art of the Deal"?
DR PADILLA: He is more likely to lose his job actually as result of that than impress President Trump.
THE CHAIR: If I can summarise what I think your position is, Dr Padilla. You do not disagree with the theory, but you say that the insight that it yields is a trite one, one that is self-evident and, ultimately, it comes down to an analysis of the facts concerning the outside options, among other things?
DR PADILLA: Yes.
THE CHAIR: Also you can then go back to the effect on Qualcomm, which is -- I mean, that is part of the analysis of market power as well.
DR PADILLA: Ultimately it is a question to see whether there is a corpse or not.
MR RIDYARD: I think the most productive place to go now is to go on to talk about Dr Padilla's leverage analysis, you know, very much with this sort of predictable testable propositions notion in mind.
Dr Padilla, my first question to you is: when you sort of engaged in this analysis, I am just interested to know whether -- how you took into account the evidence on the file, which is cited in Mr Noble's report, about the internal documents of Qualcomm, the

assessment of Mr Altman and Mr Wise, one of whom said, you know, there is a high correlation between licensing royalties and our position as a chipset supplier.
I mean, what -- in a way, your analysis says there is not any correlation so what do we -- we are going to have to sort of wrestle with those two factors so how did you take that into account when you --
DR PADILLA: I did not. I ignored all documents in that regard and I was looking at the facts following this very old dictum that in God we trust and from everyone else we want data.
MR RIDYARD: So you think the best way to deal with that is just to ignore it and look at the --
DR PADILLA: I am not good at interpreting documents. It is not my specialty so I was looking the facts to the extent that I could collect facts and with, you know, a number of measurement issues that we will discuss in due course.
MR RIDYARD: Okay. That is a fair position to take.
Mr Noble, do you have any points on that before we move into the nuts and bolts?
MR NOBLE: I think there is a question of how one interprets those statements. I think Qualcomm took issue with my interpretation of them so, in a sense, that is a determination that will have to be made about what did

those mean? What was meant by those statements? I would say that if we are looking for empirical evidence, I think there was quite an interesting exchange, I forget which witness, about this -- the stick in China that talked about non-compliance, and I did, after that, notice an interesting document which is {POF/629/7}, which I think in a sense provides a different kind of empirical evidence, because it is in the field as opposed to looking across the royalty rates.
So what this does not show you is differences in royalty rates, but what it does show you is the extent to which compliance is high or low depending on Qualcomm's share.
When I looked at that, I noticed that in those top two rows, "Premium" and "High", you have QCT's share being high and in the "Mid" and "Low" entry you have slightly lower shares and then you see seeming effect on compliance rates which appeared to be consistent with --
MR RIDYARD: What is "compliance"? What does that mean?
MR NOBLE: Well, I understand in the context of the witness -- I forget which witness it was. One of the other slides near here talks about the "stick" that they referred to.
MR RIDYARD: Probably Mr Rogers.

MR NOBLE: So my understanding of that was it is compliance with reporting and so it is essentially -- are they reporting all the units that they are paying? So -- it is a weak indicator, but I did think it was consistent with the notion of what was being talked about in those Project Berlin statements which said: when we do not have a high share, then people in a sense do not -- they might challenge us in some way and of course what we are talking about here are legitimate challenges via FRAND, what here is being talked about is, arguably, illegitimate challenges by not paying, but it did strike me that it is a useful slide to have in mind in your search for empirical tests.
DR PADILLA: Just one quick comment on this. Just I am not able to interpret this chart, but based on something that Mr Noble has said, I think that it is important to understand that in this business, this business of licensing, one of the problems that licensors find typically is verifying units. I think that either because you charge per unit rates or even ad valorem rates, identifying units is important and if that means that when you are selling chipsets you are in a better position to identify units, that is a question to disentangle as well.
MR RIDYARD: So, in that case, let me ask a different kind

of question then, Dr Padilla, which fits in with what you actually did and how you did it, and that is: when you embarked on your analysis, what would you have expected to observe, if the theory of harm was indeed valid? What is it that ——

DR PADILLA: What I would have expected to find is a correlation between the degree of dependency and royalty rates. I would have expected that at times in which Apple and Samsung were more dependent on Qualcomm and they would be, you know, more exposed to this threat and therefore they would agree royalties that were higher. That was a testable proposition that I was —— the null hypothesis, should I say.

MR RIDYARD: So your explanatory variable there is the —— I know you try a few, but the main one is at any point in time what proportion of my chipsets do I buy from Qualcomm?

DR PADILLA: Right, and I was looking at three measures, including one that is forward—looking.

MR RIDYARD: Sure. But that does not correspond to how you look at market shares, does it, because your market —— your market share analysis —— your market definition is not —— is not —— even though you go for OEM—specific markets, the market share in that market is not Apple or Samsung's purchases from Qualcomm, it is a different

calculation, is it not? So is that the right explanatory variable to be looking at?

DR PADILLA: I also looked at that. So in the appendices I looked at not the share that Qualcomm had vis—à—vis Apple and Samsung, but also the market share that it had in the market that they had defined.

MR RIDYARD: You found the same results?

DR PADILLA: No correlation.

MR RIDYARD: Okay. Mr Noble, do you have any comments on that aspect?

MR NOBLE: For me, the main question here really is about the extent to which the null hypothesis tallies up with the theory of harm as articulated by the Class Representative, because the point that I set out in I think the seventh report is that there are two aspects to the theory of harm. There is the direct effect, which is the notion that the ability to leverage an individual affects their rate, which I think is, as Dr Padilla outlined, I think that is at the heart of his expectation that there would be a slope. Whatever this measure of dependence is, whether it is market share or individual OEM supply, you would have those that are very dependent, high rate; those that are not very dependent, low rate, and some line in between, but the theory of harm has the two elements which is that ——

which I think means that these observations are not independent.

There is the indirect effect, which is that Qualcomm agrees rates with people and then uses those previously agreed rates in the negotiations with the new people and, as we see, it is clear that those previously agreed rates are at least one of the feedstocks that go into any external dispute resolution process and so it means that there are essentially two mechanisms by which the theory of harm can impact these rates. So it is not obvious that not observing a slope is —— can show you that the theory of harm is not valid. It could in fact be consistent that the theory of harm is valid, because actually if Qualcomm is successful it has pushed all of the rates up.

MR RIDYARD: Yes, I see the point that the observations are not completely independent and, obviously, if you were able to do a laboratory—controlled experiment, you would obviously make sure that was not the case and that is a problem in many exercises of this kind. Maybe it is more of a problem here, given the emphasis which is placed on MFN clauses and FRAND and comparability, but is that not a factor that would maybe muddy the waters, rather than make the exercise sort of invalid?

MR NOBLE: Well, I guess the question is how muddy do the

waters become? You know, I think there is a question that they can become sufficiently muddied that you would not expect there to be an effect that is observable.

You might also expect that Qualcomm itself does not, in a sense, that it is content with a particular level of royalty, that it might self—restrain, that it might have the ability with certain OEMs to achieve even higher royalty rates, but it does not do that because what it wants to achieve is a uniform or a more uniform royalty rate because there is a risk to this whole edifice, as I think we talked about yesterday, that it might only take a few OEMs to launch successful publicly—known FRAND challenges to bring the whole thing crashing down. If that is a realistic threat or at least it is a threat that is always there in the background, then that will be a rational expectation why, in a sense, that would pull down the top of that slope that Dr Padilla is trying to identify because Qualcomm itself is restricting itself. It is not seeking the highest possible royalty rate that it could have achieved.

MR RIDYARD: But there is a big variation in the rates. Obviously we are not going to talk about the numbers in detail, but when you look at the charts across the OEMs, I mean, there is —— there is a nice big variation in

outcomes in terms of royalty rates. So does that not sort of —— does that in any way undermine your concern here?

MR NOBLE: Well, I think this comes back to what is it that we are looking at in those charts? We are looking at net rates for a start. These are not just the one—way rate being paid by the OEM to Qualcomm. Lots of the rates have cross—licences in them and so, in a sense, you are looking at the net position that exists under that rate, where there has been a trade, a value between two parties, and so that adds further noise into the data.

I think another point that is actually very important in —— and I looked at that in my ninth report or maybe in one of my appendices —— is the China rates. You have a mix effect and so even though we might think that the China rates and the non—China rates are in the same relevant market, that does not mean that they are not different things and they have different prices. It is a bit like looking at SoC and thin modems. They might compete with one another, but they are different things and so you have to be careful if you smoosh together the prices of both of them and I think I highlighted that if you adjusted —— if you corrected that China rate factor, it moved some of the rates very,

very substantially into different places.

So I think there is a lot of mud going into this water is my overall concern.

THE CHAIR: I thought it would be a good point to take a break now for five minutes and then we will come back and to remind everyone that we are going through until 12.30 today.

MR SAUNDERS: Could we turn the heating up?

THE CHAIR: It does seem to veer wildly from Arctic to tropical. I felt yesterday it was a bit too hot in the afternoon. I will ask. Thank you.

(10.59 am)

(Short Break)

(11.11 am)

MR RIDYARD: I would like to just pick up from where we left off. Mr Noble, I think you were just making some —— you had just made some comments about one particular aspect, which was the China/non—China distinction. Dr Padilla, I mean, I will give you a chance to respond to that, but it seems to me it is part of a wider issue, which is if I go back to my cartel analogy, if you do a cartel analysis, you would obviously want to know when the cartel happened and when it did not happen and you might want to do a comparison between those two times, but you would not simply look at price during and after the

cartel; you would also want to control for as many other factors as possible. You know better than me how one goes about doing that, but, I mean, in your analysis you have not —— you have not done the econometric analysis. I am not criticising you for that. But, nevertheless, the sort of substantive concern is still there that maybe there is a failure to account for all the other influences and that is why we are not seeing the correlation that we might have seen from the theory of harm.

How do you respond to that as a general issue?

DR PADILLA: As a general proposition, it is a fair criticism. I think I have tried to deal with it in a number of ways, given the information available. So, for example, with respect to cross—licensing, first, I have noted that cross—licensing in the case of the value of cross—licences for Qualcomm is limited. This is actually consistent with the CR's case in terms of dominance in the assessment of dominance. Then I have looked at, you know, not for Apple and Samsung, but when looking more generally, I have looked at restricted attention to contracts without cross—licences and there are a few and that is why I cannot do econometrics, but the pattern is not fundamentally different.

Focusing attention on Apple and Samsung, the

cross—licensing position of Apple and Samsung over the years has not changed that much. Apple has been relatively weak in patent portfolio until very recently and Samsung, on the contrary, has had a patent portfolio that was much more significant over time. So the comparisons over time for Apple and Samsung in a sense control for differences in cross—licensing.

In addition, whether I have thought is —— I have done is the following: I have said, okay, if there was cross—licensing, when would that be the value of cross—licensing in which way it could affect my results? If I am finding no relationship, when would it do this? Okay. When would it generate a positive correlation between chipset dependency and royalties?

Then I look at and find that actually the evidence suggests that cross—licensing agreements are more common —— let me just look at my notes to make sure that I do not mislead you. Cross—licensing agreements are more common for those that have low dependency, which means that, if anything, had I controlled for cross—licensing, when I find that there is no relationship would have become a negative relationship.

So cross—licensing as a confounding factor does not pose problems in my analysis.

Then other factors. China. Well, China is an issue

fundamentally before 2015—2018. I have looked at what happens after that and, again, you find no correlation. So that is indirect evidence that the China effect cannot be a confounding factor that corrupts the results.

In general, as we all know, confounding factors matter if you can prove that that confounding factor is in a sense correlated with a variable that you are trying to investigate. You know, there are many factors that would imply changes in the level of royalties, but I am not going to change or I am not going to generate a correlation or high correlation between dependency and prices. Mr Noble can correct me, but I do not think that he has identified or discussed the correlations between the alleged confounding factors and dependency.

To the extent that I have been able to do so, I have tried to look at that guided by superiors, looking before 2015 and after 2015 and so on.

So am I telling you that this is perfect evidence of no correlation in the sense that you can attribute probability 1 to that? No. But at the very, very least what I am telling you is that, you know, the allegation that there is a tiger, that tiger is not —— that tiger is not in India. The allegation is about a tiger in Hyde Park. So that the only testable proposition is one

for which there is no evidence with the data available and, you know, trying to exploit that data to the best possible way and to, you know, given the data limitations.

MR RIDYARD: Mr Noble, your reaction to that?

MR NOBLE: Well, I guess the first reaction is that a reminder about the direct and the indirect theories of harm, that in a sense it is not obvious to me one would expect to see a slope in the first place. So that is the first point.

I think in terms of the empirical application point, I mean, on the cross—licences, it is not just the cross—licences that are the issue. There are transfers in and there are kind —— and there is marketing incentives and so on and some of these royalty agreements are quite complicated as well so there is a bit of a debate about exactly what is the number. I do not think I can say the names or the numbers, but there is an appendix in my report that talks about one of those numbers and how it can move by a factor of 3 depending on, you know, the actual outturn performance of that particular entity.

So, in a sense, there is a question mark about almost like the vertical position of various dots because of that.

On the China rates, I think my appendix in my seventh report showed that I think there is —— I do not have the number to hand unfortunately, but there are quite a number of observations that moved by a couple of percentage points, which, given the base that they are starting from, is significant movement for those specific observations and so I think when you take all of those factors into account, you have a lot of uncertainty about where are these dots meant to be and you then have a question mark about, well, am I even expecting to see a slope?

So for me, taken in the round, I think it means that unfortunately I do not think this leveraging correlation analysis really answers the question that we want to know the answer to.

DR PADILLA: Two comments. On the second comment, what you have said is incredibly unfair and it is incredibly unfair for the following reason: there is no allegation that you have been able to make that generates a positive correlation. You may move one point or another, but there is no one —— no notice adjustments would generate a positive correlation. So raising doubts about one point or two points does not change the picture. So that is terribly unfair.

With respect to the indirect effect, the indirect

effect is a double—edged sword for the CR, because the indirect effect could apply in one direction or the other. The indirect effect could be saying there is somebody that pays a higher royalty, therefore everybody is going to pay a higher royalty because of ND, but it could be the other way around because there is somebody that is not exposed and does not pay a higher royalty. Everybody pays a low royalty. In fact, it is much more likely to militate in that second direction than in the first direction. If you see the logic of MFNs and, as you know and I do not want to, you know, disclose confidential information, some of these royalty agreements have MFNs. The MFNs tend to equalise in the downward direction, not in the upward direction, so the indirect effect, I think that is highly overstated, speculative, even the variation that you observe in royalty rates. I think that in the record —— and correct me, Mr Noble, if I am wrong —— there is no evidence that you have presented of a positive correlation after having made any change to the data.

MR NOBLE: I mean, I think from my perspective it is —— I mean, this is why, the first comment that I made in the seventh report was to really call into question what is the null hypothesis because it was not made clear in Dr Padilla's leveraging report. He has very helpfully

articulated that and for me, you know, as I understand the Class Representative's theory of harm, it does not rely on there being a slope and so not observing a slope simply does not answer the question for us.

In terms of the —— I think there was one point we have not covered, which I think is quite important, which we touched on yesterday, which was the role of non—asserts, because we have talked about the sort of position of the dots, as it were, but it is also important to know what is this measure of leverage. Of course I think, Mr Ridyard, as you outlined yesterday, there is a threshold question of those, about should they be taken into account or should they not, because there is a question mark about the linkage to dominance and how they fit in with the theory of harm, but assuming that they should be taken into account, that would shift some of the dots very substantially to the left and to the right and so I highlighted —— it is in {EAOE/17/17}. I do not think I can read out these numbers, but I give three examples. So it is page 17 of this one. (Pause)

MR RIDYARD: While we are waiting for that, maybe just to clarify the point about why in the first place you do not necessarily expect there to be a correlation and that is because of the lack of independence of the

observations primarily, is it?

MR NOBLE: Yes. It is because there are two aspects to the theory of harm. It is the —— you know, plus the non—independence of the observations in the MFNs and so on that one observation can only influence another.

MR RIDYARD: So what is the other aspect?

MR NOBLE: The other aspect is the indirect effect of the theory of harm, which is the idea that you pull up the rates. I mean, essentially they are two sides of the same coin, but you are pulling up —— so imagine that you start with —— there is one agreement. You are successful in leveraging that agreement. You achieve rate X. In the second agreement rate X is then either via MFN, via negotiation or via the fact that it would in all likelihood be used as a benchmark in a FRAND litigation. Any of those might influence the rate that is agreed in negotiation two and so that might pull that observations towards rate X.

THE CHAIR: It is your tainted counterfactual point?

MR NOBLE: Exactly. The historic agreements can then influence the future agreements and essentially pull them together.

MR RIDYARD: Maybe this is just the way it is, but it is kind of a little frustrating that, you know, on the one hand we have your bargaining model, which does not yield

sort of testable propositions of what really ultimately matters, and then you are saying that Dr Padilla's attempt to do it also cannot yield testable propositions. We sort of have a double —— you know, two —— two sort of untestable areas and it is not obvious what we —— how we wrestle with that. I know that is not an easy problem to solve in this or any other forum, but there is a certain amount of frustration. I understand Dr Padilla makes that argument —— he obviously interprets that negatively for your case, as you would expect, and we are just trying to struggle with ways through that problem.

MR NOBLE: I agree, it is a challenge, and we keep coming back to the point that I think ultimately there is no getting away from the fact that one needs to look in detail at whether or not, in a sense, the story that has been set out by the Class Representative better fits the facts.

MR RIDYARD: Yes.

DR PADILLA: Can I take you for a second to figure 4 in JP3 and I don't know the reference.

MR RIDYARD: You should finish, Mr Noble, this point, which we were waiting on the system.

MR NOBLE: Yes. So the point that I am making here is that the non—assert agreements, and we have, I think, I do

not know whether I can say that name —— can I say that name?

MR RIDYARD: Do not, because ——

MR NOBLE: So there is a chipset supplier in paragraph 2.35. They have a non—assert agreement in place and assuming that one should take that into account that it might mean that Qualcomm has some control or ability to restrict or stop that chipset supplier from supplying some of the OEMs that they are being supplied, then if that is true, then one should consider putting that into the measure of dependence that you use in this correlation analysis.

The point that I highlight here is —— and I give three specific examples —— that there are three OEMs that are then named where you see one of them here, and what I am saying is the left number is the number of the dependence number that you would use or, rather, is used in Dr Padilla's analysis and the right—hand number is then the dependence number that you would use if you took account of this specific non—assert agreement.

If you go over the page, you see the same point repeated twice for two further OEMs {EAOE/17/18}.

So I have just given an illustration here of the fact that for these three OEMs, for this one non—assert agreement, with this one chipset supplier, you can move

the dial on very substantially on three dots. There are several other non—assert agreements. It is quite difficult to pass all of those agreements but, for example, there is one with VIA that I do understand is valid for potentially similar years to the years that we are talking about here and that was talked about quite extensively in the evidence about the fact that they might supply chipsets for Samsung mobile phones.

So again, one is faced with the same question about, well, if it is true that these non—assert agreements could affect the reliability of that supply, then it is something that you should consider putting into the dependence measure of this analysis. So what that would tend to do is, you know, as you see here, it can move some of these dots very, very substantially.

DR PADILLA: May I take you to figure 4 and then I will take you to figure 5 in my third report. While we do that, let me say that all these points about the non—asserts, about VIA, etc, responded in JP4, I think that to some extent these are somewhat arcane points that I do not think that, you know, are easy to discuss here, but I think that you can read how I responded to all those points.

I want to focus on two issues that are, you know, high level and I think that are important by reference

to these figures.

MR SAUNDERS: I am obviously in your hands but, as you know, these figures are ——

MR RIDYARD: Clearly the numbers here, we are just talking about the dots on the page.

DR PADILLA: So maybe we do not need to present it. The points I am going to make, I am not going to name companies or mention rates.

If you are in figure 4, which is on page 23 of my report, you can see that —— I do not know whether that is available to you?

MR RIDYARD: I have that, yes.

DR PADILLA: Yes.

So an illustration. Take, for example ——

THE CHAIR: I do not think that is up on the screen yet.

MR SAUNDERS: {EAOE/12/23}.

DR PADILLA: Yes, that is figure 4.

So if you look at —— let us look at years that are after 2015. In fact, let us look at 2018, for example, or around 2018 because I think that at that point there would be no disputes about Chinese rates or non—asserts, etc, etc.

All that I want to say, take any year and look vertically. Do not look at these dots in a horizontal fashion. Just look at them vertically. There is a lot

of variation for each year in terms of royalty rates. So I do not think that that squares well with the indirect effect.

If I take you to figure 5, there it changes a little bit that figure, because now in the horizontal axis what you have is dependency, you know, percentage of purchases from Qualcomm's chipsets, and in the vertical axis you have royalties.

Let me look at the lower picture, the one that is 2015 onwards because, again, that deals with some of these confounding factors. Take any particular degree of dependency. 45%. 35%, whatever number, and take a vertical line. You see a lot of variation. That does not square with the indirect effect.

MR RIDYARD: I can see that. You have taken us to two figures there. One was expressed in the royalties per unit and these are ad valorem. I was going to ask you —— they yield quite different pictures.

DR PADILLA: Yes, we can go to figure 6 which is ——

MR RIDYARD: No. I just wanted your views on whether you thought one was superior to the other, because they tell quite different pictures, do they not, from one another, for reasons which are kind of quite easy to understand?

DR PADILLA: Yes. We have —— I have been doing the analysis both in per units and ad valorems to make sure that the

absence or presence of correlation was not a factor or was not affected by the royalty base.

In the case of Qualcomm, and given that it tends to deal on ad valorem basis, I think that it is preferable to look on ad valorem basis, with one caveat, which is that there are royalty caps that are per unit and that is something that needs to be factored in in the calculation of the ad valorem.

But I think the results are consistent whether you look ad valorem or per unit in the sense that there is no observable correlation.

MR RIDYARD: I understand that your results apply on either, but I just wondered whether there was one —— maybe it does not matter I suppose, but I just wondered whether you thought one was better than the other?

DR PADILLA: I did not have a view and the reason why I now selected figure 5 for illustration is because there are more points and there are more points because there are a number of contracts for which I do not have observations on units and therefore I cannot calculate per unit. So you have 47 observations with ad valorems and 33 with per units. So it was for illustrative purposes, but the picture is the same qualitatively.

MR RIDYARD: It does —— this is a sort of incidental observation, but it does highlight that, you know, the

difference between chipset level licensing and end—device level licensing. The end—device level licensing allows a certain amount of differentiation on the royalty rates. I am sure —— well, I am not sure, but I can speculate that that could be one of the reasons why —— one of a number of reasons why end—device licensing might be considered preferable in some ways.

DR PADILLA: That is one of the reasons. Another reason is that not all SEPs read on the chipset and therefore one ——

MR RIDYARD: I have that argument too, yes.

DR PADILLA: —— of the problems is that you would have licensing at two levels and possible double—dipping concerns.

MR RIDYARD: Yes. Mr Noble, is that —— I mean, there is a —— I think it is a point I made before the break actually, there is a large amount of variation in these rates, but do you have any points on that?

MR NOBLE: Well, I think it is useful to start with the ad valorem rate, because I think, to my eye, what you do observe here is you do see quite a lot of clustering around similar rates. I shall not say what they are, but in the top half of this chart you see a lot of numbers that are the same and in the bottom chart you also find the clustering, it is a couple of percentage

points different from that, but, again, I think to my eye I do observe a degree of clustering and I think, in a sense, I do not think that these indirect mechanisms, these observations have to mean that they are identical to one another because there may —— there are OEM—specific factors that I think both Dr Padilla and I accept may well influence the specificities of that rate. There are also issues about risk sharing and so on that, this means that people are —— you know, in a sense, there might be a way to express them on the same basis, but have we definitely found what that is? I do not know.

I think for me there is a sort of primary question about, does one observe in this data —— is the position of the dots consistent with the fact that these indirect mechanisms via MFNs, via expectations of what might be taken into cannot in a FRAND challenge, via the way in which the parties negotiate by referencing past agreements, and indeed we have not talked about the NDRC. There is also reference to the fact that I think Qualcomm itself says that the NDRC rate acted as a kind of focal point for a lot of negotiations in the later years.

So, for me, in a sense, there is a question, just sort of zooming right out, how much information or value

can you extract from these dots? Because if what you are trying to find is a slope, we keep coming back to that fundamental question of do we even expect there to be a slope? I think I have a question about whether we really do.

DR PADILLA: Can I answer to some of this very briefly?

The clustering. The clustering happens pre— 2015. The clustering happens with respect to, as you look at the names of the companies, companies that are very, very identical, very similar. I think that we are talking the CMs. So I do not think that that is a good counter—example.

MFNs. MFNs would imply clustering at low level, not clustering at a high level, because MFNs are equalising with better terms and conditions.

I really do not see the objection. I mean, let me clarify what I am saying. I am aware of the limitations in the data. That is always the case in every single empirical analysis. Unfortunately, in economics, rarely we can conduct controlled experiments.

MR RIDYARD: We are familiar with that problem, but, I mean, arguably there is a lot —— this is a very difficult task to achieve, you know, given the data that we have here. I mean sometimes those constraints are more problematic than others.

DR PADILLA: Yes, but the question is what inference you draw from all these criticisms?

MR RIDYARD: Yes.

DR PADILLA: You need to think about what is the inference. Let me put it this way: suppose that we had done the analysis with all these limitations and there was a positive correlation, what would you expect Mr Noble to say? That that was consistent with the theory of harm? Then I would say ——

MR RIDYARD: I think he would probably put it a bit stronger than that.

DR PADILLA: Yes, possibly. Then I would try to find obstacles and I would, well, there are limitations but I would be in a much more difficult position because I would have to rebut and one of the things that he would ask me to do is to show that any of these confounding factors that you have identified would generate no correlation or the opposite correlation.

What we find here, doing, with limited data, many, many robustness tests is always no correlation. He is fundamentally saying, you know, I do not trust it, but the fact is that there is no positive correlation and that has inferential value, especially given that it is the only testable proposition that emerges from his models.

MR RIDYARD: I understand what you are saying and we will have to think about it.
DR PADILLA: It is for you to decide.
MR RIDYARD: As with all these things.
Just to run through some other possible sort of angles on this. There are the control groups that you use, Dr Padilla. Can you just talk us through what is in those control groups and why you think they are control groups.
DR PADILLA: So there are two control groups and, frankly, I think that that is much less important in terms of my evidence than the analysis for Apple and for Samsung. So I want to emphasise this, that the core part of my analysis is the evolution over time for Qualcomm —— sorry, for Apple and Samsung. So we are talking about a robustness test in which I am trying to see whether the correlation would emerge when you look at other OEMs.
What I thought is, well, let us try to identify two groups that would be not affected or less affected by these threats. One are people that have never purchased; okay? There are very few of them. So then I was looking at the CMs, at the Contract Manufacturers.
Now, the Contract Manufacturers, in principle, are less affected than any other OEM because a very

significant chunk of their business, if not most of their business, is with licensed OEMs. There is a second reason to think that they are less affected and this is that when they enter into the agreements with Qualcomm, they enter, as you can see in the figure that we have before us, enter into those agreements early on —— sorry, I think it is figure 4, not figure 5 {EAOE/12/23}. They enter into agreements that were very forward—looking into forward—looking technologies, at points in time which they could not fathom —— know what was going to be the position of Qualcomm in the relevant chipset markets.
Now, having participated in the debate with Mr Noble over the months now, would I say that the CMs are completely unaffected? I think that at this point in time —— not at the time —— I would say, well, no, they are less affected and significantly less affected but I don't know —— I cannot tell you that they would not be affected at all. But, again, it is just a robustness test, a control analysis that is seeking to verify the robustness of my findings, not the main test.
THE CHAIR: Can you explain a little bit more your response to Mr Noble's criticism that the CMs needed to have Qualcomm in their portfolios so that they could provide the relevant chipsets to the OEMs.

DR PADILLA: So they would be exposed —— the CMs would be exposed if they intend to supply to an unlicensed OEM. Then they would be exposed because, at that point in time, they would need the chipsets and they would need to be licensed. To that extent, they are exposed.
Now, given when they signed those agreements, that hypothetical scenario —— that scenario is extremely unlikely to have affected the negotiations because they were entering into these agreements relatively early on and therefore the probability which they could have attributed to that scenario, one of facing an unlicensed OEM, in a situation in which, on top of that, that OEM was, you know, intending to develop a product for which the only chipset available would be a Qualcomm, is extremely unlikely.
THE CHAIR: So is this a point about when they entered the agreements, that it was far too early in the lifecycle of the products for them to have known that they would need to incorporate a Qualcomm chip? Is that what you are saying?
DR PADILLA: Yes, but, in addition, taking into account that they will need to think that there is a scenario in which, with certain probability, they are facing an OEM that is unlicensed from Qualcomm, but dependent on its chipsets.

THE CHAIR: Yes.
DR PADILLA: If we look at figure 3, where you have precisely the timing, if you look at the relevant agreements in figure 3 {EAOE/12/22}, all of those agreements are, I think, identified in red in this picture and that is why I was telling you that they were very early on in the process.
THE CHAIR: So are you saying that in order for them to have a dependency relationship, that would have —— they would have had to know that there would be a future dependence of the OEM —— of their OEM customer and, also, that that OEM customer would not themselves be licensed, those two things?
DR PADILLA: Right.
THE CHAIR: That would have then fed back into the relationship of dependence of that CM when they entered into the agreement?
DR PADILLA: Correct.
THE CHAIR: You are saying that would have been impossible at the time?
DR PADILLA: Impossible, but I cannot rule it out. I corrected myself as saying I cannot say "impossible" but I think that it is a probabilistic relationship which is highly doubtful that, for example, in year 2004, somebody would have anticipated that, in year 2019 there

would be a dispute between Apple and Qualcomm or a negotiation between Apple and Qualcomm in which Apple at that point was still not licensed. I think there is a disagreement about whether it was licensed or not through the CMs, but they would have anticipated 15 years ahead and that seems to me highly unlikely.

MR RIDYARD: Mr Noble, do you want to comment back on that?

MR NOBLE: I mean, I think the way I think about the CMs is, I think, as I explained in my reports, I do not see them as really being that fundamentally different from the OEMs themselves. If you do not need a licence, why go to the trouble of getting one, because it is not free to go through the process of acquiring one?

We see that CMs generally have gone and got licences so we do not have a lot of evidence about why did they go and do that? Then there is a question mark about what information or value do those CM licences give us? On the one hand, we could have a situation in which they are —— they need these licences. You know, they desperately need them, in the same way as an OEM needs them, so if they desperately need them, they are not very different from an OEM. So they are not really independent. They are not unaffected because, you know, perhaps they do want to sell to lots of unlicensed OEMs and that means that in order to be an attractive CM they

need a licence in order to be able to do that.

So there is that question about are they really that different anyway?

You might say, well, maybe they are. Maybe these are free agents and they could do with or without a licence and therefore they can behave in a fundamentally different way. If that is true, then in a sense this looks a little bit like the bypass option that I was talking about on RTL, that CMs could act as this sort of safety valve. You do not need to go and have a dispute with Qualcomm yourself, you can get a CM to do it on your behalf, but I think the question mark here is whether we really have any evidence that that is really what CMs were doing, or is it, alternatively, the situation that CMs, you know, licences are —— maybe it is a nice—to—have and if it is a nice—to—have, then I do think that second leg of the theory of harm really matters because, particularly in this chart, you see that it is a very straight line of dots.

If this is a nice—to—have, as a CM you do not have a lot of incentive to go and spend lots of money on expensive, uncertain litigation and so maybe you just take the standard terms.

MR RIDYARD: When you say it is "a nice—to—have," you think it is just an insurance policy, a back—up?

MR NOBLE: It could be an insurance policy. It could be that most of your customers are licensed but there might be a couple that are not. You do not want to be exposed on this and so it is a fairly cheap thing to do. I do not know enough about all of the facts to be able to distinguish which of those it is, but all of those scenarios in my mind lead to the conclusion that there is a very large question mark about how independent these CMs are in that regard.

Maybe —— there was the second point. I do not know whether Dr Padilla should respond and then I can come back to that.

DR PADILLA: Just on this point, very, very quickly. I think that, okay, let us assume that all that is true. So that means that this prospective market theory that we will discuss at one point works over periods of 15 years. So in 2004, when the company that entered into their agreement, is thinking that in 2019 there may be a threat because there is going to be an unlicensed OEM, whose identity I do not know in 2004, who may need then —— and somebody that is going to be dependent on Qualcomm's chipsets at that point in time and here, in 2004, I anticipate all that and therefore I am willing to pay a lot because I am concerned that maybe then I am going not going to be able, if I do not enter

the agreement now, to have the chipsets that I need to supply to that unlicensed OEM.

Is that the theory, if I understood it correctly, because if I understood it correctly, it is not very plausible?

MR NOBLE: But the question is: does the CM really pay this anyway, because the CM makes phones when it is told to make them by somebody else? So if it has 100% passthrough, it may not have a very strong incentive to care very much what this royalty rate is. If it feels as though it has the going rate, whatever that going rate is and it has some sense and it possibly gets that from negotiation with Qualcomm, this is the rate that everyone else is paying, that may be good enough for it, because it does not give it any competitive advantage or disadvantage relative to anyone else. It is not coming out of its own cheque—book, because it makes phones for OEMs and OEMs reimburse CMs for the components, the manufacture ——

MR RIDYARD: This attractiveness as a partner to an OEM —— I mean, if I can get a low royalty rate and go to an OEM, then I would be a more attractive partner to the OEM than if I had a high royalty rate, would I not?

MR NOBLE: Yes, there is a possibility that a CM could do that, but I think we have not seen any CMs behave in

that particular way.
DR PADILLA: There is competition between CMs.
MR RIDYARD: I was not saying that is how they behave. I was just saying they are not indifferent. If there is choice of royalty rates, then the CM is not indifferent and it is not saying someone else is paying the bills, I do not need to worry. It is fundamentally affecting how attractive they would be as a maker.
MR NOBLE: Only for the unlicensed OEMs, because the licensed OEMs in a sense actually the same licence almost becomes irrelevant because it is the licensed OEM rate and so if this is an insurance policy, then potentially it is quite an expensive insurance policy to go and buy if you are trying ——
MR RIDYARD: I can see that point.
DR PADILLA: I would like to remark that there is competition between CMs and that is relevant.
MR RIDYARD: Yes.
MR TURNER: Sorry, it is probably a very basic question. The ad valorem rate that the Contract Manufacturer's pay is based on the OEM's price, or the Contract Manufacturer's price?
DR PADILLA: So the ad valorem is a percentage and it will be calculated on the basis of the NSP, the Net Selling Price.

MR TURNER: For the OEM?
DR PADILLA: For the OEM.
MR TURNER: Those are the figures you have used here?
DR PADILLA: Yes.
MR NOBLE: There was a second point.
MR RIDYARD: Yes.
MR NOBLE: So that was, in a sense, what one could term sort of the Garden of Eden point, which is this idea that in a sense an OEM, if you observe their first ever licence rate, because they were not buying —— definitionally, if the chipset supply practice has been applied, that arguably applies to all first ever licences and I think that is a bit of a threshold question because if these Garden of Eden rates are really clean, then the whole theory of harm does not work because, of course, all OEMs could threaten not to use Qualcomm at the very first negotiation that they ever had and not to use them and seek to try and give a very attractive rate and have a FRAND determination, whatever route they might take at that point, but I think the issue here is that ——
MR RIDYARD: I do not think I understand that. If I am an OEM, I cannot threaten not to use Qualcomm if I am dependent on Qualcomm.
MR NOBLE: But I think that the rationalisation that Dr Padilla has outlined is that there are certain OEMs

that prior to signing the licence were not using Qualcomm and of course that is definitionally true because for your first ever licence Qualcomm will not sell you anything until you sign the licence.
The reason that I reject that as a benchmark is because, in a sense, if that were true, then in a sense all licences cannot be affected. It is just —— the chipset supply practice, almost like this whole theory of harm, is not internally consistent.
So the logic here is that you could be sat there, readily anticipating in the relatively near future, I will need these chipsets, hence why I need to pay that high licence rate.
DR PADILLA: I think we are in agreement that the theory of harm is not internally consistent. With that I agree and I actually think that you made a point that is very, very useful, but it is not in the Garden of Eden, it is East of Eden and the point is the existence of the CMs and the fact that they are licensed actually undermines the theory of harm in a very significant way. I know that there is a point that maybe you want to discuss later, but otherwise I can take the position now.
That is simply that if I am Apple and I can be supplied by a CM, which is licensed, irrespective of how dependent I am on Qualcomm's chipsets, I always have the

option to go to the CM. The CM may be paying a high royalty or a low royalty, but then the cost of the threat —— the importance of the threat is fundamentally different, because it is no longer that I am not going to be able to sell phones.
MR RIDYARD: It is not an injunction threat, it is simply a higher licence fee.
DR PADILLA: It is a higher licence fee that I may be able to recoup when I litigate. So actually the CMs from the perspective of the CR are East of Eden.
MR RIDYARD: As that point has come up, Mr Noble, what is your response to that?
MR NOBLE: Well, I think there is a factual question about, you know, the extent to which people could do that.
MR RIDYARD: Yes.
MR NOBLE: There is also a question mark about the extent to which different OEMs do in fact use CMs. Not all OEMs use ——
MR RIDYARD: But if they could —— I mean, we know at least one does.
MR NOBLE: Yes.
MR RIDYARD: If they could —— if that was available to them, if it was plainly a matter of paying a higher rate, going back to your bargaining model now I suppose, that would be quite —— that would be a much less —— it would

mean the cost of going to FRAND would be much less, would it not?
MR NOBLE: Yes. If the following things are true, then I would agree with that statement. So as an OEM, you need to be using and be comfortable to use CMs. We know that there is at least one that ticks that box. The second thing that needs to be true is that you —— that CM needs to be licensed. Again, I think it is true that we tick that box. But the third thing that needs to be true is that you need to be sufficiently confident that you can go and have a dispute over a licence rate and that there is not going to be some problem with that supply from your CM. I think that is really a factual question about whether that is true or not.
MR RIDYARD: Yes.
MR NOBLE: Because if there is high degree of uncertainty about that, then you are potentially back to square one, because actually you do not feel very confident of taking that route.
MR RIDYARD: But if you were confident of that, then game over?
MR NOBLE: If you are confident of that route, if there is zero or very low infinitesimally small probability that there will be disruption via that route, then I think, yes, it does change the outcome. It does make having a

dispute costly, more costly, because during the interim you are having to pay a higher rate.
MR RIDYARD: That is a financing problem. I mean, that is —— I am sure the numbers are big and everything, because all the numbers are big in this industry, but it is not —— it is quite different from the injunction threat, is it not?
MR NOBLE: Yes, it is definitely different from the injunction threat.
THE CHAIR: Because at that point it is essentially a cashflow point, is it not, because you pay the higher rate in the interim, you are not going to get your rebate.
MR NOBLE: Well, I guess it depends on do you pay the higher rate and then you go to a lower rate once you get your FRAND determination or is it that once you get your FRAND determination you then sort of —— it is as if you always paid that rate? There is a difference between those two scenarios. In a sense, if you are paying a premium for two or three years whilst you have your dispute, then obviously that is a significant cost to you potentially in hundreds of millions, but I do not know the answer about quite what that FRAND dispute would mean; would you then get a refund for that or would you not?

THE CHAIR: Your modelling does not assume one or other outcome of that?
MR NOBLE: No. So my modelling is focused on the idea that there is a credible threat of some kind of disruption.
MR RIDYARD: It is the injunction, is it not? In your model the threat is you cannot make phones unless you have ——
MR NOBLE: Yes, or there is a realistic prospect that you cannot make phones, yes.
DR PADILLA: If I may, just one point. Actually here if we were to take seriously the indirect effect that Mr Noble has been defending, once again, you do not need that every single OEM has access to the CMs. It is enough that one has access to the CMs.
MR RIDYARD: Because of the —— because of the sort of ——
DR PADILLA: Unfairness and all that stuff.
MR RIDYARD: Okay, yes.
DR PADILLA: So here the indirect effect would actually, as I mentioned before, unravel the argument.
MR RIDYARD: I see that argument.
MR NOBLE: Can I just clarify. I am just trying to find the reference for you so you have it to hand.
My model does not require that you cannot make phones. I should just make that very clear. What it does focus on —— I am just trying to find you the reference because I underlined it. Where is it? It is

{POE/21/87}.
So this paragraph sets out what the model is based on. So it is saying the first feature of the model is based on the notion that the use of Qualcomm chipsets is associated with higher pay—offs to OEMs relative to using third—party chipsets. So what it is based on is the notion you can stop them using the Qualcomm chipsets and then if we jump one sentence, it says:
"This payoff may consist of higher profit per handset profits or, higher total handset sales volumes (or a combination [of the two])."
So one mechanism by which this could work is that you cannot sell, for example, the CDMA phones that we talked about, 30 million phones, they are gone. You do not really recoup those at all. Another option might be you have to come up with a lesser solution that means that you do sell phones but you make less money on those phones and that is still ——
THE CHAIR: You cannot charge a premium price ——
MR NOBLE: Exactly, because they are less premium phones than you would have otherwise ——
DR PADILLA: Except that this does not deal with the concern of the CMs, because the CMs are using the same chipsets.
THE CHAIR: Can I go back to your point, Dr Padilla, just the last point that you made, which I took a note? You

said if you are taking seriously the indirect effect in the theory of harm, it is enough that one OEM has access to the CM. So are you saying in that case that one OEM would create that positive halo effect which would then correct the horns effect that you might have from everyone else? Is that right?

DR PADILLA: Even if there is somebody that is dependent and has no access to the CMs, that person would be protected. But I want to emphasise point 6.20 does not help address the East of Eden problem that I mentioned, because that means —— that is saying Qualcomm either stops producing or goes to an inferior alternative, but with the CMs, the alternative is not inferior, still it is the same chipset, this Qualcomm chipset.

MR RIDYARD: I just wanted to go to one other aspect of the licensing data and, again, without obviously talking about specifics, is there any significance or anything of interest to us in looking at the path over time of the royalty rates that we observed in those charts?

DR PADILLA: The path —— I do not think so. I tried to look at this by looking at segmenting various different periods, because I was worried when I observed the fact that it was kind of a downward trend, whether that downward trend over time could be explained by changes in dependency or other confounding factors.

So I have looked at three periods, for example changes in the quality of Qualcomm's portfolio, and the lack of correlation is still there. So I am not able to explain to you why there is a downward trend. I think that to some extent responds to the NDRC pressure. There may be changes in the quality of the portfolio etc. So this model does not explain why that is the case, but what I think you can rest assured is that trend is in no way related to the dependency of the OEM on Qualcomm's chipsets. So that, I think, is comfortable, given that that is the proposition that we were trying to test.

MR RIDYARD: Mr Noble.

MR NOBLE: I mean, I tend to agree with Dr Padilla. I do not think there is a lot to be gained over time. I think we are going to come on to it, but I think in the early years there is a lot of question marks about how reliable the dependency measure is because of the RTL non—assert issue and in later years there is then the question about the NDRC and whether that has impacted the rates.

MR RIDYARD: Let us talk about the NDRC intervention. Can you just summarise your concern or —— and how that impacts this analysis.

MR NOBLE: Yes. So, in a sense, if we step back, what is

the analysis trying to do? It is trying to say we have a variety of bilateral negotiations between different OEMs that achieve royalty rates and the way I understand Dr Padilla has operationalised is the notion that we can observe some features of those negotiations, which is the chipset dependence, for better or worse, and then we try and identify correlation associated with that.

That, of course, requires that it is an independent bilateral negotiation. There is the time dependency issue which we have talked about, that past negotiations affect current negotiations. So that calls that into question for one reason.

Then we have a second reason to question that assumption, which is because we have a regulator that expressed some concerns on an antitrust basis about Qualcomm's behaviour. There was then a resolution which I understand then does not admit liability or there is no clear finding from that that somebody did something right or did something wrong, but then what you have is essentially an outcome —— essentially a regulated price that has emerged that in a sense then clearly impacts the rates that are then agreed between different parties.

So, in a sense, one can call into question, well, really what information or value is contained in these,

because if this becomes a sort of benchmark rate for better or worse, then, you know, how does one interpret that in the correlation analysis?

MR RIDYARD: Do you need to take a view about whether the NDRC resolution or the royalty rate that came out of NDRC intervention, whether that took the price, you know, below the competitive level or below the FRAND level or was it still above it? Do we need to take view on that here?

MR NOBLE: I mean, I think purely in the context of the leveraging analysis, I think the leveraging analysis is almost agnostic to some of those things and it is really saying —— it is a correlation detector and I think my question really with it is what is the information or value or those later data points, because if they are not based on bilateral negotiation between an OEM and Qualcomm and instead they are based on a recommended price from a regulator, then I have a question mark, well, what does that tell us? It tells us that some of these negotiations were based on the recommended price from a regulator and that is what it tells us. It does not tell us about the theory of harm, which the theory of harm is —— that there is an effect of the leveraging that made these rates high in the first place.

MR RIDYARD: So even though some OEMs might have more

leverage over Qualcomm or be more dependent on Qualcomm than others post the NDRC event, you therefore would not expect to see a differentiation between what they managed to achieve?

MR NOBLE: You might do, but I think there is a prospect that it will pull —— it sort of —— the observations lose their independence and that really matters when you are doing a correlation analysis. You know, it is like an uncontrolled progression analysis. If those observations are not independent, we then have to think very hard what information or value are they bringing to the table.

DR PADILLA: If I may, I think what you are basically saying is that the theory of harm collapses following the implementation of NDRC, because then what you are saying is that there is no bilateral bargaining so your model just collapses. The threats are irrelevant because the rate is determined by NDRC and the NDRC was not particularly affected by any threat. Therefore, the theory of harm collapses.

MR RIDYARD: Mr Noble ——

MR NOBLE: I do not —— I mean ——

DR PADILLA: But it follows from what you are saying.

MR NOBLE: I do not think it does, because if you think the theory of harm is right, then you would anticipate that

it is —— there is a reasonable prospect that the rates are high —— are too high. The NDRC expresses a concern that it thinks the rates are too high. It indicates that it prefers a lower rate. Some negotiations are influenced by that, but there is still a question mark about whether or not those rates are at the correct level that they would have been if this whole process had not happened at all. So I do not see how the NDRC resolution fundamentally undermines the outcome.

MR RIDYARD: Sorry, I do not see why that —— I can see how it creates a possible step change in royalty rates, but I cannot see how —— if you think the theory of harm works before the NDRC resolution, I mean, it ought to carry on working afterwards, if it has validity. So you would still see —— expect to observe differences in royalty rates depending on how much leverage Qualcomm had over the ——

MR NOBLE: I mean, this goes straight back to the point about it is not obvious to me that you would have expected to see a slope in the first place.

MR RIDYARD: In that case, there is not much point in any of this conversation, is there?

MR NOBLE: Yes, but I think there are already a variety of mechanisms which would mean you potentially do not see a slope. This is yet a further one.

MR RIDYARD: I am not sure I follow why —— I can see why the slope might be in a different place or it may be if the NDRC took rates below the FRAND rates, then I can see it would have any impact because you do not care about going to FRAND if you are already below FRAND, but elsewhere it seems to me that if there is —— if there is something to observe here, then we should observe it before and after the NDRC.

MR NOBLE: I mean, yes. You might take the view —— in a sense, let us put to one side my sort of indirect theory of harm. If you think it is just about the direct theory of harm, then in a sense it applies at all time periods, yes, I would agree with that.

MR RIDYARD: Okay.

DR PADILLA: I was going to make the same point.

MR NOBLE: Yes. The other points I have made about, you know, in a sense the accuracy with which you can observe the vertical or the horizontal to any particular dot, those apply, you know, at the various time periods too. So ...

MR RIDYARD: Anything else on this aspect?

DR PADILLA: Can I just make one quick comment and it is that you acknowledge, Mr Noble, your bargaining model does not include the NDRC?

MR NOBLE: It does not explicitly include the NDRC, no, but

it does —— it does include the impact that a non—competitive royalty rate might have via the indirect mechanism. So if this is similar to that, then it does include that. So it does not exclude it explicitly, but you could think of the model as including it implicitly via that mechanism.

MR RIDYARD: One moment while I just check through my list of questions. (Pause)

One thing which we have not talked about —— we have talked about, you know, the main mechanism in the theory of harm being the actual or implied threat of withdrawing chipsets. We have not talked about the alleged withdrawing of technical support and back—up. I mean, how —— maybe it is not a question that you can really answer, but do you have a view on how important that might be in the scheme of things?

MR NOBLE: Well, there are two ways that that can matter. One is that in order to use someone's chipsets, I think it is uncontroversial that you need to integrate it with your handset and so —— we know that that takes one, two, possibly longer years in order to build the handset and calibrate it and so on. There are two reasons why that matters. One is that the technical support comes before the commercial supply of the chipsets. So if you withdraw —— if you withhold the technical support, it is

almost the precursor to then withholding the commercial supplies, because if you have not been able to integrate it in your handset, you cannot —— there is no point buying them because you cannot use them.

MR RIDYARD: If you depend on Qualcomm for that support?

MR NOBLE: Yes, yes, quite. You know, these are their chipsets and so it seems plausible that you may need some assistance from them, as opposed to doing it all in—house.

The second aspect is one can think of the technical support as more of a signalling mechanism. So —— sorry, maybe I finish on the first point.

The first point is the technical support comes before the commercial supplies and so if you cut off the commercial support, in a sense, it is almost extending the lead time. So what we observe in the data is: are you acquiring commercial supplies because most of the data we have only relates to commercial supplies. It does not relate to engineering test samples and so on which you might get earlier. So, in a sense, we have a kind of greyness in our ability to observe when people actually use Qualcomm, but we know that the technical support comes before that so it is a sort of precursor point. So that is the first point.

The second point is then really about a signalling

mechanism, that one does not actually have to cut off the commercial supplies of chipsets. One can take a first step down the road of doing that by —— there can be a delay in your technical support. So you are sending a signal to your counterparty in a negotiation, take me seriously because, "Oh dear, the engineers did not turn up". It is a small threat that you might be going through with —— I mean, that is, in a sense, how one can think of those kinds of behaviours.

DR PADILLA: I do not have much to offer there. I think that as a matter of the economic analysis that we have performed there is not much that we have done there.

The only thing I would mention is that the leveraging analysis looks at, you know, the position not just at the time in which the agreement was entered into, but one year before. So that may cover something, but, as I said, this seems to me like a set of factual allegations that the economic analysis has not really dealt with.

MR RIDYARD: Okay. I think that is probably all we had on your leveraging analysis.

I am just looking through my list. I must say there is not a great deal left on the list. One thing which I did want to just run through, just going through how we interpret the evidence from Apple's dispute with

Qualcomm in 2016 to 2018, the big one where the dependence was not there and it did seek to renegotiate the royalty rate.

Mr Noble, can you just talk us through how the facts of that incident, how they sort of, you know —— what they mean for your theory of harm? What lessons can we draw from it?

MR NOBLE: So the logical flow is that prior to that, Apple was dependent on Qualcomm's chipsets. It did not feel able to use its outside option and then, if you think of it through the lens of the bargaining model, you can think of it —— that pay—offs gradually shift and once Intel becomes a credible supplier, because they are initially brought on board to provide UMTS chipsets, once they become credible to provide the CDMA chipset as well, that is the moment at which Apple can then essentially —— the pay—offs have changed in the bargaining model. It now finds a different leg of the bargaining model attractive to access, it goes and accesses it, because there may have been a cost associated with using Intel chipsets, because I think there are some media reports that suggest people did perceive them as maybe not being as good as the Qualcomm ones, but that difference does not appear to be very large at that point. So that is consistent with the

idea that Intel has caught up enough that Apple is then willing to flip to a different leg of the bargaining tree. It goes —— the evidence is then it appears to go all in on fighting Qualcomm and then that continues. It takes a period of time obviously for those actions to happen.

Essentially then 5G comes along.

(Redacted — confidential information)

But I understand the evidence of Heather Mewes —— how we interpret that and the alternative explanations is a factual question —— but my interpretation of that is the —— you can read that as Apple essentially feeling as though we have run out of time. We need 5G. We need it now and there is a significant lead time to getting that into our phones. We do need to launch a 5G phone. Essentially they flip back to a different leg of the bargaining tree because they ran out of time. That is essentially the logical flow of the ——

MR RIDYARD: So to observe an actual —— to observe the effect of the theory of harm in real life, we would need a four—year window of non—dependence and this was only a two—and—a—half or three—year one and it was not enough time.

MR NOBLE: Yes, essentially, that for whatever reason they ran out of time and they felt compelled to reach

a negotiated settlement, rather than continuing with the outside option.
MR RIDYARD: Which just underlines how unlikely it is we are going to observe the counterfactual, even when we see non—dependence.
Dr Padilla.
DR PADILLA: Look, I mean, I think I cannot interpret the facts. I do not know. I think that two observations. One is that my experience in this industry, Apple one way or another has been trying to lower royalty rates for as long as I can remember sometimes through antitrust actions, sometimes through regulatory actions, sometimes through lobbying, but that's neither here nor there.
I think that the important point that I wanted to make is that when I heard Mr Noble explaining the narrative around this litigation, I was thinking that those statements are in contradiction with the existence of OEM—agnostic markets and fundamentally in contradiction with the indirect effect that he has mentioned and, in addition, suggest that there should be a correlation between dependency and royalty rates, if you take a sufficiently long period.
MR RIDYARD: The last point again, sorry?
DR PADILLA: That there should be a correlation —— I think

that he is going to say that you did not observe it because they were only able to litigate for two or three years, but I think implicit in his statement is had they been able to litigate for a longer period of time, in other words, had they not been dependent, there should have been a lower royalty, which I think contradicts the claims made or the allegations made contrary to the leveraging analysis.
MR RIDYARD: How does it do that?
DR PADILLA: Yes, because I think that he said before, when discussing the leveraging analysis, that there is no reason why we should observe a relationship between royalties and dependency and when reporting on this story about Apple, he is basically saying at that point Apple was seeking to obtain a lower royalty because now they were less dependent.
MR RIDYARD: Yes.
DR PADILLA: So there is a fundamental contradiction there.
MR NOBLE: Well, I do not think there is a fundamental contradiction.
DR PADILLA: Maybe there is a contradiction, even if it is not fundamental.
MR NOBLE: I think, as I said, the bargaining model indicates that it is analysing a specific negotiation about a royalty between an OEM and Qualcomm and so

I think the question that you, Mr Ridyard, put to me was about how does that narrative then line up with, you know, facts and, as I have outlined, I think it is consistent with the facts that in a sense it takes a period of time for someone to exercise this outside option. Apple appears to have sought to do that and then, essentially, ran out of time.
Obviously Qualcomm advances an alternative explanation that it was a great deal anyway and they realised that, but, you know, in a sense that is really —— one has to then judge that against the full set of facts of the case.
MR RIDYARD: Yes.
I think that that pretty much takes us to the end of our list. Unless ——
MR NOBLE: I did have one point because, Mr Ridyard, you asked yesterday about market definition and you were pointing to, I think, one of my charts, which, for reference, was {POE/21/20}. It is figure 2.3. So that top right.
MR RIDYARD: Yes.
MR NOBLE: I think you were wondering out loud is there a way we could use this as a natural experiment and I think the conversation we had at the time, Dr Padilla kindly reminded us, at least when we are talking about

Apple, there is not a lot of —— this would not work because, on his market definition, Apple is only a 5G market at that point.
I did go and check that actually last night and I realised that on Samsung, Dr Padilla does include 4G and 5G right the way through here and we are helped out because figure 2.3 is —— we have sought to control for the mix effects by only focusing here on system on a chipset.
Now, that happens to be the kind of chipset that Samsung tends to buy and so it might be useful, because if we have this in mind —— this is obviously a very large price shift, but I do not know if we could turn up Dr Padilla's helpful chart that showed us the percentages of volume of 5G chipsets that Samsung was buying? I do not actually have that reference unfortunately. I did look for it.
MR RIDYARD: Page 57 of the fourth report, figure 4 {POE/22/57}.
MR NOBLE: Yes, I think that sounds right. So it is the bottom chart there. I just wondered that visually one might then essentially perform that sort of simple correlation analysis just to see, you know, does it look as though there is some material change in the take—up rate associated with 5G by Samsung at that point?

To my eye, you know, just doing that late last night, it did not seem that there was one, but I thought I would just highlight that because I think you were ——
MR RIDYARD: I did raise it, yes.
DR PADILLA: The only point I would make is that you are not controlling for a number of confounding factors here.
MR NOBLE: Touché.
MR RIDYARD: Thank you for pointing that out.
I think we should give counsel a chance to ask any clarifying questions they may have at this point.
MR JOWELL: May I ask one, and I appreciate of course it is not an invitation for cross—examination, but I do have ——
MR RIDYARD: The microphone.
MR JOWELL: The microphone. I do have one point of pure clarification where I am just not entirely clear in particular on one aspect of the bargaining model what Mr Noble's position is and I would just like —— I think it would save time in cross—examination if we could clarify it.
So, as I understand the position, one of the assumptions of the bargaining model is that in order for there to be a credible threat, the relative cost to Qualcomm of foregoing chipset sales has to be less than the relative cost to the OEM of disruption of handset

sales. So that, I think, is —— I think I understand that correctly.
My question is really, I noticed that when discussing that issue, Dr Padilla emphasised, say, the proportion of Apple's profits that, say, CDMA phones would represent, whereas Mr Noble was talking about the absolute amounts. So my question is really to the experts, and in particular to Mr Noble because it is his model: is that relative cost to be measured in absolute terms or relative to the size of the total respective businesses? So, in other words, are we interested in the lost profits to Qualcomm as a proportion of total chipset sale profits —— of its chipset sale profits versus the lost profits to Apple as a proportion of its total handset sale profits, on the one hand, or are we, instead, interested in the absolute lost profits to Qualcomm in dollars and cents versus the absolute level of lost profits to Apple in dollars and cents?
MR NOBLE: When we are deciding whether there is a credible threat ——
MR WILLIAMS: Madam, I endeavoured to ask a clarificatory question to tease out something from Mr Noble yesterday and you asked me was there anything about Mr Noble's evidence I did not understand and I said I did understand his evidence, I just wanted to tease a point

out ——
THE CHAIR: But Mr Jowell is actually saying that there is something he does not understand, as I understand it.
MR JOWELL: Yes, I genuinely do not know what the answer is.
THE CHAIR: I did ask you whether you were asking a point of clarification on something you did not understand and you said "no" and Mr Jowell introduced his comment by saying he is not trying to tease any particular point out effectively, he just wants to know —— understand what their position on this is because he did not understand from their comments. I think that is a fair point. I do not think he is going anywhere particularly with his question.
MR JOWELL: I may go ——
THE CHAIR: He may then take that somewhere in cross—examination.
MR NOBLE: So the way the maths works in the model is that this should really be seen as absolute amounts. That is how it is set up.
MR JOWELL: Absolute amounts.
MR NOBLE: Absolute amounts, yes.
MR RIDYARD: Cash amounts?
MR NOBLE: Cash amounts yes. I have tried to set out —— if you look at table A5.2, which is at {POE/21/30}, that sets out the various equations and so it is not

relativistic to the size of the business, in part because these are businesses that do other things too, and so I am trying to focus here just on the royalty and the chipset activities.
THE CHAIR: Dr Padilla, do you have any comment on that?
DR PADILLA: No.
THE CHAIR: Thank you.
Mr Williams, or indeed Mr Moser or Mr Armitage, did you have any points of clarification?
MR MOSER: I do not.
THE CHAIR: Thank you. Well, then that, I think, concludes the hot—tub. Thank you very much, Mr Noble, Dr Padilla. We found it a very helpful session. Thank you for the courteous and co—operative way in which you answered the questions. You are released from the hot—tub. You can now speak to your legal team and anyone else as much as you like until you come to your cross—examination next week.
MR NOBLE: That is very helpful.
Can I just say that I am a convert to page limits. I was not at the beginning of this case but I am now.
THE CHAIR: That is very helpful.
DR PADILLA: Super helpful, yes.
THE CHAIR: Thank you both.
Now, are there any housekeeping points that we can

usefully deal with just before we actually conclude today's proceedings?

Housekeeping

MR MOSER: There was the update on the 1782 material you had asked me for at the end of the week. I think it is de facto the end of the week. We expect to send a draft, or further draft —— I am not sure —— of the proposed joint notice that the parties want to send to Apple and Samsung, to propose to have that with the other side by today. Subject to their comments, we will then send that off to Apple and Samsung tomorrow, either on a joint basis or not, if it cannot be agreed on a joint basis.

THE CHAIR: This is an attempt to cut through some of the confidentiality issues?

MR MOSER: Yes, exactly.

THE CHAIR: All right.

MR MOSER: Then there was the suggestion that perhaps, if the parties reach an impasse, one might have to ask the court in the US. We have been looking into that. That is a possibility.

THE CHAIR: Yes.

MR MOSER: As we expected, it will take time. So it would probably take several weeks, at least, so beyond the trial, but I expect before judgment, unless you give it

instantly.

THE CHAIR: Well, that is obviously not going to happen.

MR MOSER: So we would then hope that it could be concluded before.

THE CHAIR: That was my hope in raising the issue, that we had the debate now. If we cannot get an immediate answer and you do have to go to the court in the US, then hopefully that can be resolved so that by the time we get to judgment, as much as possible of that can be published in unredacted form.

That is very helpful. I am grateful to you for dealing with that.

MR MOSER: I do have one last point on this ——

THE CHAIR: Yes.

MR MOSER: —— which is that our US colleagues have said it might be helpful —— it would likely be helpful if there were a letter from this Tribunal that could be shown to the US District Court, if necessary, but I leave that as a thought for now. I do not ask for anything on that now.

THE CHAIR: I think if you need us to write, you will need to let us know and indicate what it is they would find helpful to know from us.

MR MOSER: We would happily suggest a draft.

THE CHAIR: Yes, all right. Thank you very much.

So we will re—group on Monday. I understand —— I think Mr Noble will be going first in the witness box, is that right?

MR MOSER: Yes.

THE CHAIR: So we will have Monday morning with Mr Noble and Monday afternoon with Dr Padilla.

I am not sure if any one of you are turning up to this afternoon's or this evening's lectures. I expect you will have much better things to do. All right.

MR WILLIAMS: Certainly other things to do, madam, yes.

THE CHAIR: Other things to do. All right.

So I probably will not be seeing you all back here this afternoon, but we will look forward to seeing you on Monday.

(12.34 pm)

(The court adjourned until 10.30 am on Monday, 20 October 2025)

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