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

Wednesday, 15 October 2025

(10.30 am)

Housekeeping

THE CHAIR: Yes, Mr Saunders.

MR SAUNDERS: My Lady, I can address you very briefly about the question that you had in yesterday's proceedings relating to the licensed patents point, if I may?

THE CHAIR: Yes.

MR SAUNDERS: Then we have, obviously, the hot-tub to follow.

THE CHAIR: Yes.

MR SAUNDERS: So, as you observed yesterday, Mr Gonell made a distinction in his evidence between licensed products and licensed patents. The relevant section of the evidence is {Day5/138-139} of the transcript. That was in private, I think, but this particular point is -- I will not go back into the prelude to it, but this particular point is not something that needs to be in private.

It was put to him that Apple did not need -- did need a new licence for 5G in 2019, the CM licence would not work and Mr Gonell said:

"No, that is not true. The CM licence would have worked for their purposes just fine."

"Question: That is simply not right, is it, after

everything we have just discussed?"

His answer was:

"No, I think you are missing the distinction between licenced patents and licenced products. Were multi-mode 5G-enabled phones, that included CDMA, licensed products under those agreements? Yes. Unquestionably yes. I do not see how anyone could dispute it and so could -- would we have sold chipsets to them? Would we have checked the box that says 'yes, they are licensed for using those chipsets in those products', yes."

Then it was put:

"5G SEPs were not licensed patents, were they, under those agreements?"

The answer was:

"If they were beyond the capture date, then they were not licensed patents, but that by itself did not affect the supply of chips or the ability to get chips that had 5G."

THE CHAIR: That was the section that I was referring to.

MR SAUNDERS: That is the distinction.

So the way that Qualcomm's licence agreements work, and also many others in this industry, is that they define certain licensed products and those are the ones on which a royalty is due and they also provide rights to make and sell those licensed products. One of the

licences we looked at with Mr Gonell defined a licensed product as a handset which is capable of working to the CDMA air interface. That means products which worked on CDMA 3G and UMTS.

So those are licensed products, if they are capable of doing that. All phones that practise CDMA standards are licensed products under that agreement, regardless of whether they also practise some other standards.

So it is the CDMA that triggers whether or not you are a licensed product within the scope of that agreement.

The important point for present purposes, and what Mr Gonell explained in his evidence, is that under Qualcomm's chipset supply practice, Qualcomm will sell chipsets for use in licensed products regardless of what the scope of the licensed patents might be. So the licence we were looking at provided rights to make and sell multi-mode handsets, so 4G multi-mode handsets, which were LTE and they also had 3G, which is a CDMA standard through UMTS or CDMA2000 and so they are covered.

THE CHAIR: So, put shortly, at the point at which 5G -- the 5G standards were introduced, if you had a phone, a handset which had a 5G chip in it which was backwards compatible with the 3G either CDMA --

MR SAUNDERS: Yes, a multi-mode product that had -- that practised 3G, that is a licensed product, therefore it is covered.

If you sell, for example, a 5G-only device, then you are outwith the --

THE CHAIR: When you say "multi-mode", are you using that to encompass something which had -- which was 5G but also backwards compatible with LTE and one or other form of 3G?

MR SAUNDERS: Exactly. So that is the usual -- so there are no products -- Apple did not sell any single-mode 4G or 5G phones. They are always backwards compatible and include some flavour of CDMA.

THE CHAIR: Some flavour of CDMA, exactly. So if you have a phone which is a -- which is a 5G/4G and then some flavour of 3G, your position is that it was not necessary for there to be a new licence agreement for those products, because those products were covered by the existing licence --

MR SAUNDERS: Because they were licensed products.

THE CHAIR: -- because they were licensed products. What would have been necessary would have been if there was a handset that was only 5G --

MR SAUNDERS: Yes.

THE CHAIR: -- a pure 5G that did not have some flavour of

3G or 4G, for that matter, and, in that case, a separate licence would have been required.
MR SAUNDERS: Yes, because there is no —— they are not within the scope of the definition of "licensed products".
THE CHAIR: All right.
MR SAUNDERS: I think as, Madam, you picked up, we did not think there was a particular dispute about this, because in paragraph 11 of my learned friend's note on Wednesday, they averred that prior to 2019 Apple was licensed via its CMs.
THE CHAIR: Yes.
MR SAUNDERS: So it seems that —— perhaps during —— someone came up with the idea in cross—examination of making some kind of distinction with 5G, but if you think about it the same point —— the same construction and the same point runs for 5G, 6G, 7G, whatever. The question is: does it have CDMA?
THE CHAIR: So the reason why Apple was licensed in respect of 4G through its CMs was that the 3G licences covered a multi—mode phone or backward compatible phone which was 4G and some flavour of 3G?
MR SAUNDERS: That is the point.
THE CHAIR: All right. That was our understanding of Mr Gonell's evidence, but we wanted to just check that

we had understood that section of the transcript correctly. That is what you say is the interpretation of what he said.
Obviously if the Class Representative takes a different view as to how we should understand that part of his evidence, they will make submissions on that in due course.
MR SAUNDERS: Yes, although at the same time it would help if —— because they have already telegraphed this seems to be common ground.
THE CHAIR: As regards 4G.
MR SAUNDERS: So, if it is no longer common ground, it would be helpful to know that that is something we have to deal with and also it may be illegitimate for them to change tack on that, but let us not debate that now.
THE CHAIR: Thank you for that helpful clarification.
Mr Moser or Mr Williams, is there anything that either of you want to say about that?
MR WILLIAMS: No, Madam. There is nothing I want to say about it. I think from our point of view it is a matter for submissions in due course. I hope in the course of the cross—examination the Tribunal understood the points that we were putting to the witness about the way in which the position had been understood between the parties historically and about, I think, precisely as

Mr Saunders says, the distinction between the scope of the licensed product and the scope of the licensed patents and the point that we were seeking to get at in cross—examination was about the scope in respect of the licensed patents and the short point is —— or the short point we were getting at is that if Apple wanted to implement 5G using 5G chips, it needed to be licensed in respect of 5G SEPs and so that is the point that we were getting at in cross—examination.
THE CHAIR: Well, no, the response to that from Mr Gonell was there is a distinction between licensed products and licensed patents with the —— and our understanding of that was as Mr Saunders has confirmed is also Qualcomm's understanding of his evidence.
MR WILLIAMS: We understand that was his evidence. I think where one goes beyond that is a matter of submission, Madam.
THE CHAIR: Yes, but just to note that Mr Moser did not push back at Mr Gonell when he said that point.
MR WILLIAMS: No, the point we were getting at was related to the scope of the patent in respect of —— sorry, the licence in respect of patents, not the scope of the licence in respect of products.
THE CHAIR: When Mr Gonell made the point about the distinction, it was not suggested to him that that

distinction was an invalid one.
MR WILLIAMS: No, any submissions we make in due course will not be calling that into question.
THE CHAIR: No.
MR WILLIAMS: They will be about the significance of whether Apple was licensed in respect of 5G SEPs.
THE CHAIR: Yes, all right. Thank you very much.
MR SAUNDERS: My Lady, just hearing that submission, there is one other point. Of course these are foreign law agreements under which different rules of interpretation apply, in particular I think in California they have slightly more emphasis on the —— relative to English eyes —— the subjective intention of the parties in setting up the agreement. If we are going to get into debates about issues of construction in closing that would obviously be rather undesirable, because you have not heard any evidence on that at all and there is nothing in the case to deal with that.
THE CHAIR: No one has suggested that there is any issue of construction on which we are going to need to take evidence of any form.
MR WILLIAMS: Any submissions we make will be based on the evidence that Mr Gonell gave.
THE CHAIR: Thank you very much.
So it is the hot—tub now.

MR SAUNDERS: Yes.
THE CHAIR: Right.
MR JOWELL: I will call ——
THE CHAIR: Yes, I think both.
MR JOWELL: And need to be sworn.
THE CHAIR: Yes, they do.
MR ROBIN NOBLE (sworn)
DR JORGE PADILLA (sworn)
Questions by THE TRIBUNAL
MR WILLIAMS: I do not know if you want me to go through the formalities in relation to signatures on reports and all the rest of it, Madam?
THE CHAIR: No, I do not think so.
MR WILLIAMS: There are some corrections to Mr Noble's report which I should just introduce, if I may?
THE CHAIR: Those have been sent in a letter to the Tribunal. We have all had that.
MR WILLIAMS: If you are prepared to take them as read ——
THE CHAIR: I think we should take those as read and I think in terms of going through the attestation to the contents of the reports, I think that could be done when they come to give their individual evidence.
MR WILLIAMS: Okay. Mr Noble, the corrections that were set out in the letter from the Tribunal, do they affect any of the opinions or conclusions expressed in your

reports?
MR NOBLE: No, they do not.
MR RIDYARD: You have received a list of the topics we would like to go through in this session. As has been explained, I am sure you are aware already, the plan will be to go through a number of questions under each of those topic headings. We will more or less try to alternate who goes first, although sometimes it may be more appropriate to switch the order.
Clearly I am going to be leading those questions, as you know, but it is important to emphasise that it is the whole Tribunal that is involved in this procedure. I am sure my colleagues will chip in with questions as we go through. It is very important, of course, that your responses are addressed to the whole Tribunal and you deal with them in that way.
Also, it is almost unnecessary for me to say but I will say it anyway: you understand your duty is to assist the court and we certainly need assistance on this case, as in other cases, from your expertise and we are expecting you to provide answers that help us to get to where we want to get to. We understand where you are coming from in your reports, but just to re—emphasise, you know, we do want your help and we expect that from you.

Okay. So, without further ado, our first topic is the question of market definition. The first question maybe I can address it to Dr Padilla in the first instance. This is this distinction between whether we would look at the market as being a market for chipsets to all OEMs in aggregate or individual markets for the supply of chipsets to either or both Samsung and Apple.
You have both signed up to the notion of the SSNIP test framework or the hypothetical monopolist framework. So my first question, Dr Padilla, is: under that framework, how, if at all, is that framework useful to determine why you prefer your approach compared to the approach taken by Mr Noble?
DR PADILLA: Right. So my understanding of the framework is that, first, you need to identify a candidate market and then, on that candidate market, you perform a number of experiments. You try to see whether the products in the candidate market define a market in itself, appropriate market, or whether you should expand the boundaries of that market.
Defining the candidate market is a tricky issue which is not really —— there is no theory about it, but I think that the common practice is to start as narrow as possible, to make sure that, given that the experiment is one—directional, whether you expand, you

do not end up with a market that is too wide in the first place.
What helps you in order to identify where to start is the theory of harm that you are trying to assess, because ultimately market definition is just an instrument, a tool, that should help you understand the cogency and the correctness or not of the theory of harm.
The theory of harm in this case concerns negotiations between Apple and Qualcomm, Samsung and Qualcomm, regarding both royalties but also chipsets.
MR RIDYARD: Sorry to interrupt. The theory of harm —— the damage claim relates to Samsung and Apple, but the theory of harm, does it not relate to everyone in the market?
DR PADILLA: My understanding is that the focus of the debate is on Apple and Samsung and I think that I would say 99.9% of the reports that both Mr Noble and I have produced concern Apple and Samsung and in fact I think that, on that basis, very little, if anything, is discussed about the negotiations that Qualcomm has with other OEMs.
MR RIDYARD: Let me just stop you there and allow Mr Noble to come in.
MR NOBLE: So I agree with Dr Padilla that, as you say, the

SSNIP test is what we are using and I agree that one should start small with a focal product, because it is a one—way test, so there is a risk of starting too large, that you just assume the market is bigger than it is going to be, but —— and I also agree with Dr Padilla that we need to look at the theory of harm in order to perform our market definition analysis, because market definition analysis is case—specific. However, I think as you alluded to, the theory of harm, as I understand it from the Class Representative, is that there is a market—wide set of behaviours that potentially impact all OEMs in their negotiations about royalties and therefore, to my mind, it makes sense therefore to start market—wide with the focal product because of that and in terms of the evidence that we have put forward, I mean, to my mind, I mean, my reports look at the whole market and also, I think, Dr Padilla's leveraging analysis does not just look at Apple and Samsung, it obviously does look at Apple and Samsung, but it does look at all the other OEMs as well and so, in a sense, you know, that is certainly my understanding that the theory of harm is about all OEMs, not just Apple and Samsung.

As you say, the damages claim is then about Apple and Samsung, but it could easily have been, you know,

Huawei as well or some other OEM as well.

MR RIDYARD: Okay. In terms of —— I mean, market definition is there as a means to an end, something to make —— to provide a framework for our assessment. I mean, can you maybe comment on how that would work? If we were to —— I mean, in principle, if we were to find that there was —— there might be an adverse effect against the other OEMs but because of Apple and Samsung's position, their extra leverage or bargaining power, whatever, there was not an effect on them; what is the point of us getting agitated about the effect on the other players when the damages claim is just focused on these two?

MR NOBLE: Well, the reason for that is that there are two mechanisms by which the theory of harm can have an impact of Apple and Samsung. Mechanism one is obviously the chipset negotiations between Apple and Qualcomm and Samsung and Qualcomm, but mechanism two is via the other royalty agreements, because you see lots of evidence in the negotiations that they referred to as "benchmarks" and also, you know, as I explained in the context of the bargaining model, one can expect that —— you know, the outside option is to go and have a litigation or some other kind of dispute where it is quite possible that these benchmarks come into play and of course there is some prospect in my judgment that

those might therefore influence the outcome of that.

So it is essentially the fact there are those two elements. There is the direct element, which is Apple and Samsung, and then there is that indirect element which relates to all the other OEMs. So I think for that indirect element, one needs to think about the whole market as a whole because of course if Qualcomm was not dominant at all, then in a sense the whole theory of harm does not work.

MR RIDYARD: Dr Padilla, any comments?

DR PADILLA: I disagree on a number of fronts, as you can imagine.

Number one is if indeed the theory of harm concerns everybody, then I think that the case that both Mr Noble and I have argued is incomplete, because there is no discussion in our reports about the negotiations, both in terms of royalties or chipsets, that Qualcomm has with any of the other OEMs. There is nothing in that regard. We do not know where the negotiations with Huawei, where the negotiation with CDE, there is nothing of that sort, and there is nothing in the evidence that we have produced, the economic evidence, that helps us understand to what extent these kind of cross—contamination effect that Mr Noble was just referring to exists. There is no discussion about

whether the agreements —— OEM agreements or negotiations between Apple and Qualcomm, for example, were influenced by other agreements.

So if that is the theory of harm, then I am afraid that the Tribunal does not have the elements to decide on that theory of harm.

I think that the Tribunal has elements to assess whether or not there was abusive conduct in relation to the negotiations between Qualcomm and Apple and Qualcomm and Samsung. In fact, I think that when we are discussing in our reports those negotiations, in fact there is no discussion, as far as I can recall, in any of the reports that Mr Noble and I have produced of how other agreements could have influenced those negotiations. When we are talking about the negotiations between Apple and Qualcomm, we are looking at different points in time and all the discussion is about what was discussed, what was not discussed, what was the scope, the extent to which the chipset alleged dependency matters.

So I think that it is because of that, for intellectual consistency, that it is good to look at the market in the way that we are looking at, in an OEM—specific way.

MR RIDYARD: Just to push back a bit on that. You do look

at the other OEM deals —— and we will talk later on about your leverage analysis, but you do look at the other OEMs when you do that leverage analysis, do you not?

DR PADILLA: As a sensitivity analysis. The main focus of my third report, the leveraging analysis, is on Apple and Samsung and I think that, frankly, I could have stopped there. I think that the analysis is, you know, in terms of preponderance of evidence, looking at whether there is additional evidence that I could look at of a relationship between royalties and chipset dependency or reliance, but that is only as a robustness test, no more.

MR RIDYARD: Then just to move on then to the next point. I think this is, Dr Padilla, for you —— no, sorry, to Mr Noble. Just in terms of the practical differences between your two approaches, in practice is the main difference when it comes to looking at market shares, is the main difference the difference between including or excluding self—supply? Is that what it all comes down to?

MR NOBLE: There are two differences I think that we arrive at. One difference is the self—supply. The other one is then the extent to which we have different generations in the same relevant market.

MR RIDYARD: We are certainly going to come on to generations in a moment. In terms of the market share numbers, as it were, it is almost a question of sequencing, is it not? You agree that self—supply is relevant to the overall assessment but not in market definition, whereas Dr Padilla's approach has self—supply in the market shares and the market definition?

MR NOBLE: Precisely, yes. I think Dr Padilla and I both agree self—supply needs to be part of the assessment and the question is where. I think you are right, that is the key distinction. I say that it should be analysed when one comes on to the individual negotiations and I think, as I understand Dr Padilla, he's saying you should look at this in market definition because he is starting at the OEM.

DR PADILLA: If I may, I agree, but I think it is important to clarify the following: although it is of secondary importance in the context of the case and I would think that in general market definition is not the critical issue here because the differences are to some extent intellectual more than practical in terms of the consequences.

Including self—supply seems to me intellectually rigorous and correct and the reason is when Qualcomm is

negotiating chipset prices with Samsung or when Qualcomm is negotiating chipset prices with Apple, Samsung can leverage its ability to self—supply. Apple can then leverage its ability to self—supply. They may —— that self—supply may have no impact on the chipset prices that Huawei, CDE and others pay and we had defined a broad market, then that would be the case, but if we are trying to understand the chipset prices paid by Apple and Samsung, that self—supply is a constraint on those chipset prices and that is why it is important to keep it in, obtain the right market share figures. Ultimately, as you may have noticed, and I think we also make clear in the joint statement, market shares are high with one market or the other. So countervailing buyer power is going to be fundamental.

MR RIDYARD: I do not think there is any disagreement really on the need to include self—supply in the assessment.

Can I just ask a very detailed question, Dr Padilla, on your approach. If you look at the chip —— your market for Apple, the sort of chipsets of the kind purchased by Apple is the descriptor, that includes Apple's —— there are some very specific products that Apple buys which have been customised, it is so—called "thin modem chipsets". Can you just on a kind of practical level explain how they are different from the

kind of chipsets that are supplied to Samsung and other OEMs because of Apple's, you know, customisation requirements on these thin products. How do the thick products, which is not what they are called obviously, how do they form part of the same market as the thin products? What is the mechanism whereby they are part of the same market? Is that a supply—side substitution?

DR PADILLA: So my understanding and I am not a technical expert —— so my understanding is that basically in a chipset you have like two components, the application processor and the baseband component. The thin chipset is one that does not have the application processor, because Apple wants to retain its own application processor, and the integrated has both.

I think that our view, and I think that this is a common view, is that both thin and thick compete with each other. To some extent, and it is not quite correct to think about the thin as a thick one in which you have removed the ——

MR RIDYARD: On the demand side.

DR PADILLA: Yes. I do not know if you have any comments on that. There is no need to ——

MR NOBLE: I would agree and I think my understanding of the factual evidence is that the way Qualcomm builds its modems is that, in a sense, it has these sort of Lego

bricks. It has a modem and it then has application processors and I think there are a few other parts to the chipset as well and it then builds families around those. So, for example, I think there is the X55M —— there has been quite a lot of discussion around that. That is the first 5G modem that Apple purchased. Various other OEMs also purchased that same modem, but there is also a Snapdragon 865 system on a chip which is the thick version of it which, as I understand it, is closely related to the X55M so it is essentially, very roughly, the X55M with the other parts added on around it and other chipset players also have these —— they offer both options.

MR RIDYARD: Then just a question about how we go about our task in choosing between your two approaches. I mean, does one approach to the market definition preclude the other? Is there a right answer to this question, or could we take the view that both are valid ways of looking at things and we should look at both?

DR PADILLA: It is for you to decide. I think that an option is to leave the market definition open, given that ultimately things do not, you know —— nothing really hinges on that. But I think that in order to understand the theory of harm, the intellectual discipline of considering an OEM—specific market is

helpful and when you read both Mr Noble's reports and my reports on conduct, you are going to find that actually what we are talking all the time about is whether or not Apple and Samsung, respectively, were reliant on Qualcomm and what other OEMs were purchasing features —— it does not feature in the discussion. So intellectually ——

MR RIDYARD: You have made that point.

DR PADILLA: —— (inaudible – overspeaking). At the end of the day I do not think that you have to make a finding.

MR RIDYARD: I understand that, but one could look at —— clearly we need to look at the bargaining position between Samsung and —— sorry, between Qualcomm and these two big users. There is no question about that. The question really is could we also consider both ways of looking at the market definition are valid and it may be, Mr Noble, you would like to comment.

MR NOBLE: I would certainly say that the market—wide position is a valid position because in order to consider the whole theory of harm one needs to consider the positions of lots of different OEMs and Qualcomm needs to be dominant at the macro level, as it were. I mean, I have been scratching my head about can you do it the other way round and does it make a difference? I think potentially you could do it the other way round

and it might not make a difference, in the sense that if you start stepping out from one of the OEMs, if there is sufficient supply—side substitution, then I think potentially you end up at the same answer anyway because I think Dr Padilla and I —— I think there is some comments in the joint statement —— I forget exactly which number it is, but I think we are aligned on the fact that there is supply—side substitution between different types of chipsets, high quality, low quality, thin, SoC, etc, and since the OEMs often buy the same chipsets as one another, there is not a lot of bespokeness about the chipsets and it is also not obvious how much price discrimination there actually is.

I mean, yes, people do pay individualised prices, but are they paying those because of price discrimination or are they paying those because of volume—related points? Apple often pays lower prices than other people, but Apple often buys a lot more of that specific chipset than everybody else and trying to disentangle those I think is quite difficult.

So it is not clear to me —— that is quite a long answer to say I think you can start at the individual OEM and then still sort of aggregate up and then end up in the same or very similar place.

MR RIDYARD: Yes.

DR PADILLA: What I would, you know, find problematic is if the Tribunal aggregates OEM—specific markets using the supply—side substitution arguments of Mr Noble. I think that would be a conceptual mistake and a bad precedent. Using those arguments, basically you would be ruling out the possibility of identifying price—discrimination markets. So, no, we do not agree on supply—side substitution. There is price discrimination. There is quite a bit of price discrimination, because even the volume effects are the result of different competitive constraints. If I have —— can self—supply, I am going to buy less. If I am buying less, maybe I get a different price. If I am going to self—supply, I may push pressure on a lower price.

Apple and Qualcomm, Samsung and Qualcomm were negotiating about chipsets bitterly, fiercely, and trying to obtain a competitive advantage vis—à—vis the other OEMs. It is easy to identify who your counterparty is. You can distinguish Apple from Samsung. There is no arbitrage and they were paying different prices. That seems to me the poster child example of a price discrimination market.

MR RIDYARD: I think your evidence on both of those sides is very clear on that. We understand where you are coming from.

Let me move on then to the distinction between UMTS and CDMA chipsets.

THE CHAIR: Could I just, sorry to interpose, just before we get on to the next question, can I ask about the concept that has come out a little bit in the factual evidence about competition for the slots and phones and the suggestion that there is some kind of bidding market when there is a new slot opening for competition, that different suppliers are going to compete to be selected by Apple or Samsung for a particular new slot, eg the slot on the 5G iPhone.

Do you see this as a bidding market and does that impact how you approach the market definition in this regard, as in whether it is an OEM–specific market or a market–wide market definition? Why do I not start with Dr Padilla on that.

DR PADILLA: Yes, I think that that is very relevant. I think that the bidding market may or may not be a bargaining market. This bidding for the slot is OEM–specific. The slot is OEM–specific. What matters fundamentally is whether the competitors for the slot are the same or different. If competitive constraints vary across OEMs, you need to define OEM–specific markets and there is a fundamental difference in the case, you know, not always, but in many years, which is

that, for example, Samsung could bring in its self–supply. Apple could not. There were other times in which Apple had the opportunity to bring its own supply to compete for that slot and that changes the outcome quite significantly.

THE CHAIR: So you do understand this to be a type of bidding market?

DR PADILLA: It is a bidding market.

THE CHAIR: Mr Noble.

MR NOBLE: So I think when we are thinking about whether or not something is a bidding market, it is not enough just to identify that there are slots that need to be filled, because you can think of almost any market that looks like that. If I am a manufacturer, I have slots and I think there is a continuum from one end of the spectrum where something is just completely atomised that there are so many slots, there is one coming up every day, I do not think people would characterise that as a bidding market because there are so many bids ––

THE CHAIR: But that is not the case here.

MR NOBLE: Exactly, they are just purchases. But there are quite a lot of slots. Certainly if we look across the market, Apple is the exception that has fewer slots than other OEMs, but Samsung has an awfully wide range of phones. Certainly if you look globally, there are often

many, many variants of individual handsets sold in different locations with slightly different specifications and so –– and that is –– again, there are many other OEMs that adopt a model that looks much more like Samsung where they have a very large number of handsets and, again, strictly speaking, you might say each one of those is a slot that you could bid for.

THE CHAIR: So Dr Padilla said categorically it is a bidding market. Do you conceptualise this as a bidding market or not?

MR NOBLE: Well, I think in economic parlance "bidding market" means a particular thing so it is certainly a market in which bids are made. I do not think it meets the requirements of what one would classically call a "bidding market" though.

THE CHAIR: So ––

DR PADILLA: If I may just one point that I think follows directly from what we have just heard. Precisely, there is a fundamental difference between Apple, Samsung and others. Apple has a limited number of slots. Apple carries very significant volume. Apple is unique in many respects. Competition for those slots is of a nature that is somewhat different from that of Samsung. Samsung is also different from other OEMs in terms of volumes, but those are the differences that

explain differences in chipset prices, in terms and conditions, which I think that you can identify when you are focusing on an OEM–specific market definition and that you will lose –– all that texture will be lost when you aggregate the market.

THE CHAIR: Thank you. Sorry, Mr Ridyard.

MR RIDYARD: Thank you.

Let us move on to the UMTS/CDMA distinction. I will use those terms as a bit of shorthand, but just I think we understand what we are talking about when we are talking about those two types of chipsets. Clearly the dominance claims are strongest against Qualcomm on the CDMA for reasons that I think we all understand.

MR NOBLE: Just to clarify, and I think this is clear, but when we say "CDMA", we mean it in the CDMA one and CDMA 2000 sense, as opposed to the long–form code division multiplex, because I think in the context of –– I think I heard earlier Qualcomm also interprets the acronym "CDMA" in a much broader sense, that WCDMA, which is ––

MR RIDYARD: I am ––

MR NOBLE: I just wanted to clarify that that is ...

MR RIDYARD: The ones that Verizon and China Telecom and so forth ––

MR NOBLE: Yes.

MR RIDYARD: Mr Noble, the SSNIP test is about considering a hypothetical monopolist. Here, in your client's case, there is a real-life monopolist and it is Qualcomm. They are pretty much the only show in town on CDMA chipsets. So why cannot we just look at -- we know that, you know, we understand that Qualcomm did indeed charge a premium for CDMA chipsets compared to the UMTS chipsets of a similar kind. So does that answer our SSNIP test question all in one go without further ado?
MR NOBLE: Well, it might do. I think it is -- I think the logical flow that I followed in this is to say, first, are UMTS and CDMA 2000 -- are they similar qualities, in the very broadest economic sense, that you might want to pay more for them, just because one is better than the other? As far as I can see, that is not true. They are similar sorts of standards, with similar sorts of connectivity.

I think the next question is then: is there a cost difference, a variable cost difference between the two, because if one were to cost more to make, then one might expect that the price would be higher and then that might tell you something different from what you have just said?
MR RIDYARD: If prices are related to costs.
MR NOBLE: Yes, if prices are related to costs.

I do not think there is evidence of that. If anything, I have seen evidence that says that the prices seem to be the same, or in fact sometimes it appears that the cost of making a CDMA chipset might be less than it might be a UMTS one because there are some versions of UMTS chipsets that are actually CDMA multi-mode that are compatible with everything and they have the CDMA part disabled so it is a further manufacturing step.

Then I think the third question, which I think is what you were getting at originally, in some instances, although not all, we observe that Qualcomm does appear to charge a CDMA premium. It calls it I think the "CDMA adder". Then there is a question, well, how big is that? Because if it was very small, we might not be very interested in it but if it is bigger, then it is potentially telling us something useful in the context of market definition. The data I have seen suggests the CDMA adder is $3, $4, $5. It varies, I think, precisely which chipset, precisely which time period, but the kind of base price that you are talking about for these chipsets is typically $10, $15, $20.

So this is a significant delta in the prices and so, on its face, I think it is consistent with the idea that somebody holds market power in the product called "CDMA"

and that they are exerting it in some instances to some degree.
MR RIDYARD: 25% price premium sounds -- I mean, what is the point of having a monopoly unless you charge a high price for it and you are saying they have a monopoly in this product and they charge quite a hefty price premium for it. So does that -- I mean, in classic terms you would say, well, this is kind of getting us into cellophane fallacy area, that if it is an actual monopolist and it is charging this high price, obviously it has decided not to charge $10 more for CDMA and it has decided to charge whatever it is, $3 more, whatever the number is, so does that mean that evidence we have at the market prices which exist is tainted by the fact that, you know, there will be less substitution if we looked at it at competitive levels but an artificial amount of substitution arises because it is broadly already at the monopoly price?
MR NOBLE: Well, I think there is a question because I think there is a distinction between being able to charge a price that is high enough that it sends a signal about that these are in separate relevant product markets and a price that is, in a sense, taking advantage of the full short-term monopoly rent that might be available to you. I think there are two reasons to think that

Qualcomm might not have taken full advantage of that rent and therefore may not have reached the point at which the cellophane fallacy kicks in.

So the first reason is that I think there are barriers to entry to chipset manufacture but, as with all technical barriers, they are surmountable at some price so the higher you put the price, the greater the incentive that you create for someone to surmount those barriers and create a rival chipset.

So it might be the case that Qualcomm has a desire not to encourage entry. If it responded to that desire very strongly, then we might be very comfortable, in the sense that, well, where is the problem?
MR RIDYARD: I am not saying that all. I am just saying every -- pretty much every monopolist decides to stop raising prices at some point and on your view of the world --
MR NOBLE: The reason I think quite carefully about this is because there is a coherent argument against the Class Representative's case that says there is one monopoly rent. Where is the monopoly rent? On the Class Representative's case, it is in chipsets and if you take all of the monopoly rent in chipsets, then there is no more to take anywhere else. Therefore, the theory of harm does not work.

MR RIDYARD: Yes.
MR NOBLE: So I think there is then a question, well, okay, is this all of the monopoly rent? The reason one might think it is not is because actually if you have reached the point at which you can force people to be elastic, then you might think, well, we are close to that point, but Qualcomm might restrain the price that it charges for two reasons. One is to —— because it does not wish to encourage entry and the second is because it needs to save some of that rent because it wishes to use that in the chipset negotiation —— in the royalty negotiations.
MR RIDYARD: Dr Padilla.
DR PADILLA: There are a lot of things, if I may unpack.
I would like to cover them in a certain order. First, is there a premium? To tell you the truth, that is a Pandora's box. It is very complicated. If you look at chipset pricing, chipset pricing, the price of a chipset, tends to vary over time and tends to decline over time. Developing a chipset involves some fixed cost and some variable costs and in my experience, and I think you can document that by looking, for example, at the Commission's decision in the Icera case, what happens is that fixed costs are amortised over time in a declining way. So as chipsets get sold, the company is covering the fixed costs and then, you know, the

prices go down and converge in a sense towards the short—run marginal costs.
Now, that is important because there are two dimensions then that become critical over and above the variable cost of production. One is what is the fixed cost? Second, what is, when you are looking at the CDMA chipset or a UMTS chipset, whether they are at the same point in their lifetime or not?
So there may be a high premium, what you think is a high premium, but it is because some standard CDMAs are an early life, the UMTS is lower life and even at the same point in time one may sell a lot and the other one may sell less.
So establishing whether or not there is a premium on the magnitude is very, very complicated and it would have to be done almost chipset by chipset and, frankly, I have worked that to some extent and I see that but not here.
Second, how do we interpret the premium? Is the fact that there is a premium telling us that there is a separate market? Well, let me give you an analogy. Let us think about an iPhone, an Android —— a Samsung Android phone and a Xiaomi Android phone. I think that the CMA has concluded that they are all in the same market, yet the iPhone sells at a premium. Competition

between the two Android phones, the Xiaomi and the Samsung, is bound to be stronger. Maybe that means that the Android prices are going to be somewhat more similar. Apple sells at a premium, but still there is a competitive constraint. Absent that competition, Apple will be able to charge even higher prices.
So even if there was a premium, that in itself does not allow us to conclude that there are separate markets.
The SSNIP test. The SSNIP test cannot be answered by reference to the premium, because the SSNIP test, as you correctly pointed out before, needs —— when you referred to the cellophane fallacy —— needs to look at the competitive price and whether there is —— what would happen in response to a 5% to 10% increase in the competitive price.
Now, assuming that the price of the UMTS chipset is the competitive price for CDMA is incorrect, given that the chipsets may be at different point in time in their lifecycle and, in any event, have different volumes. So we will need to think about whether there is a 10 —— 5% to 10% premium over the competitive price.
MR RIDYARD: I understand.
DR PADILLA: Finally, the last point I would like to make in response, and this is elaborating on something Mr Noble

just said, is that the theory of harm that the CR is presenting is kind of a Goldilocks theory of harm. Qualcomm has to be dominant somewhere (CDMA, 5G), but not too dominant or dominant but self—restrained in the chipset market, and, on the contrary, show its nasty face exclusively in the licensing market, because if we had a monopoly in CDMA, if we had a monopoly in 5G, then what stops the monopolist from charging monopoly prices? There are no FRAND commitments here.
The story that this is going to provoke entry means that then we do not have dominance because then we do not have a monopoly.
MR RIDYARD: We will come on to some questions on that in due course. I understand where you are coming from.
I think I have heard enough to know that we are not going to get to a neat answer to these questions, but that was a useful discussion of some of those issues.
Actually I think it would have been —— could have been useful to have had some of that articulated in the experts' reports, but we are where we are on that.
Dr Padilla, on this UMTS/CDMA distinction, your contention is that they are in the same market, obviously. So what would —— can you just talk me through what would prevent a hypothetical monopolist in CDMA raising price by a small but significant amount

above the competitive level? What would make it regret doing that?
DR PADILLA: So vis—à—vis Apple or vis—à—vis Samsung because the analysis in my case is ——
MR RIDYARD: Yes.
DR PADILLA: So the issue is as follows: if you look at the purchasing patterns of, say, Apple, because the argument carries on or carries through mutatis mutandis, let us focus on Apple. Apple is buying mostly UMTS chipsets and a few CDMA chipsets. Suppose that there is a very significant increase in the price of the CDMA chipset. That means that the margin that Apple is going to make on CDMA phones is less than the margin that it is going to make on UMTS phones. Does that mean that it is going to give up all CDMA demand? Not necessarily. But it can choose how much effort to push in one direction or the other, how much marketing effort to place here or there, how much marketing support to provide to mobile phone operators that are using or relying on UMTS networks versus CDMA networks.
That is the dimension of substitution that I think that exists and if you think about it logically, and I think that all the evidence that we have seen suggests that when Apple is discussing chipset prices with Qualcomm, it is discussing chipset prices for its

portfolio. Looking at CDMA phones, UMTS phones, there are a number of slots and they —— and Apple can arbitrate in the way that I have just mentioned.
MR RIDYARD: Mr Noble, comments on that mechanism, is that how you see this working?
MR NOBLE: Well, I think the real question that helps us disambiguate between the two about whether CDMA and UMTS are competing or not is really about whether or not we think that OEMs see the two as substitutes or whether OEMs see them as complements to one another.
MR RIDYARD: When you use the word "complement", what are you talking about? So you mean in the ordinary language sense or the economic sense?
MR NOBLE: In the economic sense. The question for me is: do we see OEMs offering a portfolio of equivalent phones that are on both networks?
MR RIDYARD: That is nothing —— that is not the economic sense of "complements", is it? A complement in economics is if the price of A goes up, demand for B goes down.
MR NOBLE: Well, in a sense I think what they want to offer to their consumers is an attractive portfolio of products.
MR RIDYARD: Yes.
MR NOBLE: And so the question mark is —— so maybe I start

again.
So in equilibrium, when we are talking about the market, you have OEMs that are offering a portfolio of phones. They offer, I think, in Dr Padilla's analysis, a portfolio of phones on UMTS networks and a portfolio of phones on CDMA networks. They are seeking to try and maximise their sales by offering attractive phones. Then the SSNIP test posits the idea that we shock that system by imposing a 5% to 10% price rise but only on the CDMA chipsets, not on the UMTS chipsets. I think the question mark then is what do we anticipate that the OEMs are going to do? Are they going to withdraw, you know, certain handsets from CDMA networks? Are they going to somehow try and encourage customers to switch across from one to the other? I think if they are going to withdraw the handsets, I think the question mark for me is: why are they —— why is it now sufficiently unattractive for them to do that?
MR RIDYARD: I think Dr Padilla's answer to that was because it is now less profitable to sell CDMA phones and therefore I will put more effort into selling UMTS phones. I will not abandon Verizon or ——
MR NOBLE: Yes, but I think then the question comes because in a sense they are doing that in a derived demand sense. So ——

MR RIDYARD: Yes, everything is derived demand here, is it not?
MR NOBLE: Yes, but I think it is hard to get away from the notion that ultimately it is the customer that is really driving the attractiveness of any of these options and so in the examples I gave in the joint statement and in my report, I was imagining, okay, what happens if the OEM passes on this extra cost to the end—consumer? The price delta is very small and so the question for me then is if there is this very small increase in a $600 phone, then do you get enough substitution caused at the consumer level between that one network and the other to make it sufficiently unprofitable so that the OEM loses sales on CDMA and such that the hypothetical monopolist of CDMA chipsets loses sales on CDMA, is that likely to be enough to defeat the SSNIP? I find that very hard to —— you need a very, very high elasticity to make that maths work, because of the dilution effect that you get.
MR RIDYARD: You just say effectively because of that dilution, as an OEM, you just kind of ignore the increase in price and just carry on regardless and just ——
MR NOBLE: Well, so one option is you can put the price up and then, you know, there is then not enough ——
MR RIDYARD: In different ——

MR NOBLE: Exactly, there is not enough substitution and therefore you have not defeated the SSNIP, therefore you have stopped expanding your market on CDMA.

The alternative as an OEM is that you could do something that worsens the quality offing on CDMA and so you can —— but in a sense that is a debate to be had in a CPO hearing which is about the kind of equivalence between quality adjustments and price adjustments, but I think it matters in this context because if you withdraw a particular handset, you can think of that as the quality —— you know, the options available on the CDMA network got a bit worse and you would think that they would get a bit worse by about the amount of the passed—on SSNIP essentially and, again, so you would think it is a small delta in quality that has happened and, again, it is back to the question of are consumers likely to be elastic enough at the downstream level or not?

DR PADILLA: If I may, I will use an analogy. Analogies are always dangerous, but this is a complicated industry and the analogy I will use comes from my first job which was selling clothes.

Consider the following example: you are selling clothes and you are selling sweaters and they are different colours, green, red, yellow, and actually in

yellow there is kind of a monopoly. In green and red there is much more competition. Preferences are such that some consumers just want yellow. They will not switch to green and red, unless with a lot of persuasion. Does that mean that if you are the shop selling sweaters of all colours, you are resigned to pay whatever for the yellow colour? Not necessarily. You may buy some, but you will do things to increase the relative demand of green and red over yellow. You will put the green sweaters and the red sweaters in the shop windows. You will display them more prominently. You may give them some marketing effort that you would not give to yellow and that is the way that you discipline the monopolist. That is what happens here.

Qualcomm sells CDMA, sells UMTS. Apple buys both but actually buys very little in relative terms of CDMA. There is a limit to what Qualcomm can charge in CDMA, even if it faces less competition there than in UMTS, and that is because Apple can orchestrate a change in product mix by playing with a number of levers, including marketing effort.

MR TURNER: Can I ask: can you just elaborate on that, what those levers are and how we know that they are effective, changing customer behaviour to move from ——

DR PADILLA: When you are selling —— an OEM is selling

phones, is selling these phones either directly or through MNOs. You can put more emphasis, greater advertising, provide greater marketing incentives to those mobile networks, for example, that rely on UMTS as opposed to CDMA. Given that CDMA and UMTS sometimes sell in different areas, you can decide to allocate more marketing efforts to sell in Europe or, in particular, in the UK where you have UMTS phones and spend much less in China, responding to the price pressure.

Now, you can tell me do you have evidence of that? Well, that is an impossible proof, because if I am correct, then the prices of CDMA have been constrained to the point in which the optimal decision of purchasing CDMA and UMTS, the product mix, is the one that we are observing.

MR TURNER: But it is very different to your clothes example. Why would you not maximise your sales in Europe and maximise your sales in China?

DR PADILLA: That would be possible if you did not face budget constraints and I think that there are budget constraints. In fact, I think that yesterday I was in a dinner and Sir Christopher Pissarides was saying to Tim Harford there is one thing that we need to teach the public and this is that there are budget constraints. That also applies to Apple and Samsung. You have

a budget constraint on how you are going to push the different products because you have margin targets and, you know, those margins get reflected in the stock value.

MR RIDYARD: I think I understand where the two of you are coming from on the concepts, but let us focus in on the actual evidence.

Dr Padilla, you present evidence on the fact of the UMTS and CDMA phones selling side—by—side in what look like broadly comparable price ranges. How does that —— how effective is that evidence as a way of testing the hypothesis that we are looking at here?

DR PADILLA: That is an important question for the following reason: I would think that, given the evidence about the portfolio of products that Apple and Samsung sell, and particularly if we focus on Apple, the CDMA/UMTS mix, I could make the argument, even if there were no overlaps. Yet, I was trying to see whether it was reasonable to think that those that enter the shop looking for the yellow sweater will be willing to switch to the red sweater, because if there are many people that will be willing to switch, then the argument becomes stronger.

The way that I did so is by looking at countries where the two networks co—existed, CDMA and UMTS

co—existed, and where the phones that were sold in those networks were selling at comparable prices. That tells me that there is some substitution between yellow and red.

MR RIDYARD: Does it? That tells you that they are both selling at similar prices, but does it tell you anything about substitution between them?

DR PADILLA: That is correct. It is consistent with substitution.

MR RIDYARD: It is consistent with lots of hypotheses, but is it testing the hypothesis?

DR PADILLA: It does not tell you there will be substitution in response to a price increase of one or the other. That is why I started by saying even in the absence of the price overlap, I could argue, even in the situation in which there is strict separation in demand, no substitution whatsoever, the argument carries through for the reasons that I mentioned before and I explained.

I think that that evidence suggests that there may be some substitution.

MR TURNER: So I understand your argument that there may be the ability to influence the market over a period, but if one is interested in a bid when a new version of the phone comes along, at that point, why would there be substitution at that point?

DR PADILLA: The reason is the following: Apple makes significant margins, if I am focusing on Apple, so it does not need to lose all CDMA in order to be willing to substitute. See I think that if there is a reduction in margin, Apple would be willing to defend that margin and force a reduction in the CDMA price by substituting some volume. It does not need to sell zero. It will only reduce volume somewhat. That has an important impact on its counterparty, in this case Qualcomm. Remember when what I mentioned before: chipsets involve very significant fixed costs which are amortised over time. Apple is by no means a small player. If Apple tells you: in response to your CDMA pricing, which I find excessive, I am going to cut my demand of CDMA phones by X%, that has a very significant impact on Qualcomm's ability, not only to sell CDMA to Apple but to sell CDMA to everybody else because now it will need to amortise those fixed costs ——

MR TURNER: But Apple can make that decision when you are in an active bidding process for a new version of the phone, Apple can make —— can factor that into its negotiations that it is going to reduce its CDMA dependency, even though it knows it has those levers that it can pull for the future.

DR PADILLA: I think that is precisely what I am saying,

that when it is negotiating, it is not negotiating CDMA in ignorance of what it can do in terms of its product portfolio. As you can see, and I think it is Padilla 4, when you look at the composition of CDMA —— between CDMA and UMTS or the portfolio of these two OEMs, it varies continuously over time. It is not discrete. It is not like you buy or do not buy. You change the proportions between the two. I think that it is only reasonable to assume that that decision is influenced by relative prices of the chipsets.

MR RIDYARD: Mr Noble.

MR NOBLE: Yes, I mean, I think there is really two points that I would highlight in response to this. I think one is the fact that in the US, where I think this is most prevalent, because you have CDMA networks and UMTS networks, I presented evidence —— I forget it was either in my eighth or ninth report —— that indicated that it is heavily an MNO—led market and so you sell phones throughout MNOs and so that signals to me that there may well be some stickiness amongst customers to stick with the current network and I think, as Mr Ridyard just alluded to, I think there is a question mark about the power that this test has because observing the same price for a CDMA phone and a UMTS phone, it tells you that they are the same price, but that could be because

of substitutability or it could be because there is zero substitutability and these are entirely —— you know, they are completely separate customer groups and it is just that you have cost—based pricing and you cannot tell the difference between those two just based on the data that we have.

But we do have other evidence, and I cited some of that in my report, about OEMs making submissions to the European Commission about their willingness to substitute, but I think it is also useful to look at the instance when Apple decided to launch a CDMA iPhone because Apple did originally launch on UMTS and, as an economist, that strikes me as a coherent entry strategy. You do not make phones at the moment. You are going to go from zero phones to some number of phones. You partner with launch partners who happen to be MNOs. That makes a lot of sense, particularly in the US where it is an MNO—led market. In order to do that, you obviously make a phone that is compatible with the MNO that you are going to launch with and you sign an exclusivity agreement because, you know, that is normally how one achieves buy—in from your launch partner.

So you go through that process. That exclusivity agreement is going to run out. What are you going to do

at the end of it? Do you carry on just selling UMTS phones or do you also launch a CDMA phone, because you have now penetrated the market? I think in that example there is some very clear evidence from Tony Blevins that it was very difficult for them to conceive of not launching a CDMA phone because there are millions of customers on the Verizon network that they cannot access.

MR RIDYARD: I do not think Dr Padilla is suggesting they have to give up one or the other; he is just saying that —— after that launch period they were selling to both networks and acquired both types of chipset, but they could vary the proportions that they bought, if some event happened that made it more attractive to sell to AT&T than to Verizon.

MR NOBLE: Yes, although I think one of the issues is that in that particular example, if people are elastic between UMTS and CDMA networks, they have already performed their transition. They really want an iPhone. One would expect that they would have been transitioning away from the Verizon network on to the UMTS AT&T network so that has already happened to a large degree. So the group of people that are left on the Verizon network are presumably less likely to switch than those that would otherwise —— that in another situation where

you would just launch on both networks simultaneously.

DR PADILLA: If I may, three very quick comments.

First, the submissions in question are irrelevant because there is no dispute between Mr Noble and I that if you want to manufacture a CDMA phone, you need a CDMA chipset.

The point about not launching I am in full agreement with you, but I think that what Mr Noble would have to explain, in my opinion, is the evidence that is presented in figures 3 and 4 in my fourth report, which shows continuous variation in the product mix between UMTS and CDMA. How can that be reconciled with the stickiness that he is referring to? Even if there is a stickiness at the consumer level, I still, as the OEM, can play in terms of, you know, the emphasis that I place on one product versus the other.

MR RIDYARD: Yes. I understand.

I think we have probably covered this topic quite well, but can I just ask one last question on this topic, and that is: I mean, Dr Padilla, in your analysis you make some —— you lay some stress on the fact that in the CDMA countries, UMTS was sitting side—by—side so there was AT&T and Verizon and the same or similar was happening in the other territories where CDMA was present, but, I mean, does that matter? Would your

argument be just the same if the United States had been a complete CDMA place and then —— because we are talking about global markets for chipsets here. So does it matter about whether —— if you forced the choice to be more, you know, a one—zero choice between territories, would it make any difference to your argument or your evidence?

DR PADILLA: No, it does not really matter.

I think what is helpful in order to —— from a persuasion perspective is to realise that CDMA globally is not that important for either Apple or Samsung, but, no, I agree with you.

MR RIDYARD: Well, I mean, okay, but, I mean, I guess the question really is: so the substitution that we are talking about could have happened by just deciding, well, I will just sell more phones in Europe and fewer in America?

DR PADILLA: Correct.

MR RIDYARD: Mr Noble, can you respond to that?

MR NOBLE: If one thinks that this is the right framework to analyse it through, then I think logically you do not have to analyse it within a specific territory. I think practically I understand why Dr Padilla has done what he has done because he is looking at consumer prices as opposed to OEM to MNO prices, for example, and so ——

MR RIDYARD: I think he would lose his price observations then, would he not, under this scenario because ——

MR NOBLE: You cannot operationalise the test because at least if you do —— you have data that says there are two networks in the US and there are two phones and they are pricing in dollars and they are the same customers with similar purchasing power, it is much, much harder to even do that analysis if you look at Europe versus US.

MR RIDYARD: That would be virtually impossible to make sense of that, would it not?

MR NOBLE: Yes.

MR RIDYARD: So it is another way of saying even if —— Dr Padilla is saying his argument he thinks would work even if you just put a line through the whole comparison of the product prices?

DR PADILLA: Only Apple and Samsung know exactly how the economics work. All that I would say in this connection is that the evidence that I think that I have seen indicates that they do not deal with these chipsets in their negotiations with Qualcomm as silos.

MR TURNER: Sorry, just going back to your point that you can impact the sales in —— let us take Europe and China with distinct geographical areas, you can impact the sales by deciding how much marketing you spend in Europe and how much marketing you spend in China and you say

resources —— marketing resources are necessarily limited, they are not infinite, you are making decisions, but that applies across the whole suite of Apple products. It is having to make decisions about whether it invests in phones or whether it invests its marketing in computers, but that does not make them part of the same market. So why is that —— why is this a dominant consideration in your analysis? Sorry if that is an ignorant question.

DR PADILLA: It is a very logical question. First, I think that Apple is negotiating CDMA chipsets and prices and UMTS chipset prices with Qualcomm.

MR TURNER: Yes.

DR PADILLA: All the other things may be relevant and will be, you know, considerations for the CFO, but they are not going to matter in that discussion. So it is the possibility of substitution between those two products that is going to discipline Qualcomm when pricing CDMA. Whatever substitution happens outside those two products is not going to discipline.

MR TURNER: I understand.

THE CHAIR: So we will take a five—minute break. Just to remind you now, and I probably do not need to say it again, you are in purdah under oath until released from the hot—tub. I am sorry that that does mean that you

will be in purdah over the weekend. During that time you will not be able to talk to your solicitors or anyone else, whether in your legal team or outside your legal team, about the case until the end of your evidence in the hot—tub.

As you are aware, once the hot—tub has been completed, you will be released from your oath and then be able to return and have discussions with your solicitors before you are then re—sworn for individual cross—examination. Thank you.

MR WILLIAMS: Madam, can I say obviously most of the discussion this morning has been at a fairly general level, but it is just to remind both experts that when we start referring to the evidence of specific witnesses in other proceedings, then confidentiality issues may arise. I just wanted to remind the experts of that, because at one point we did start to drift in that direction and I thought it was helpful to raise that.

THE CHAIR: I think most of the questions should be capable of being dealt with in open session. As we previously discussed, it is very difficult for us to now tell what is confidential and what is not. So if we start straying into a confidential area, I am expecting one of you to pop up and say, "I am sorry, that is confidential" and the transcript may also have to be

redacted in consequence if anyone says anything that they should not.

Five minutes.

(11.48 am)

(Short Break)

(11.58 am)

MR RIDYARD: So we are now going to move on to a different but in some ways very related aspect of the market definition and that is between the different generations of chipsets, as opposed to the UMTS/CDMA distinction.

Maybe, Mr Noble, we could ask you first of all. We understand that we have different price levels for the chipset of different generations. What role does that play in the SSNIP test analysis?

MR NOBLE: Well, I think it is consistent with the idea that they might be separate products, in the sense that they are materially different prices for different things essentially, and so it sends a signal about the fact that these might be separate from one another, particularly at the transition period, because there is a very substantial price difference between a 4G chipset and a 5G chipset, and that is important, I think, particularly, because there are some comments, I think, in the Qualcomm Defence that suggest that the data performance, for example, of 4G and 5G at that point are

not as far apart as they then become.

So, in a sense, it may be that actually the —— there is a question mark about the qualities, as it were, but you do see a very substantial price —— it is 80%, I think, the price difference.

MR RIDYARD: So it is indicative of differentiation at least which itself might be indicative of a lack of closeness, as it were?

MR NOBLE: Precisely, but on its own it is not definitive. It needs to be considered in the round with the other evidence.

MR RIDYARD: Dr Padilla, do you agree with that?

DR PADILLA: Yes and no. Let me clarify. I think that of course if there is a difference in chipset prices, you would think that, you know, may indicate —— it does not corroborate, but it may indicate separate markets, but I think it is important that we focus attention to the points in time where I am alleging that there was substitution across generations, because those are limited. If you go to table 1 in my fourth report, you will see that I am talking basically about four years, 2011 and 2012, between ——

MR RIDYARD: Can you give me a page number on that?

DR PADILLA: Yes, page 60 of the fourth report, table 1, paragraph 191.

MR RIDYARD: Your page 60, yes.
DR PADILLA: You can see that substitution across generation happens in 2011/2012 by and large and then in 2019 and 2020. Those are transition periods. 2019/20, for example, is the period in time in which Samsung was competing with 5G phones and Apple was not competing with a 5G phone.

The existence of price differences at this point in time is not surprising and to a large extent reflects the fact that I mentioned before, that chipset prices tend to go down over the lifecycle. These are going to be —— this is the end for, say, 4G or 3G at the different points and the beginning for 4G and 5G respectively.
MR RIDYARD: Your mechanism for —— I asked the question earlier: what is the mechanism for the SSNIP test to work as between the UMTS and CDMA. It is a similar mechanism here, is it, that the —— even though as an OEM I do want to transition towards, you know, 5G over 4G or 4G over 3G and I know it is going to happen in the next few years, I have discretion about how quickly I transition and the price difference between the chipsets will condition how quickly I make that transition and I have discretion and choice over that, so that is the choice area which you think is —— provides a constraint

from one to the other in principle.
DR PADILLA: Correct.
MR RIDYARD: That is the principle. You then have to try to measure it against some evidence.

Mr Noble, do you agree with that as a mechanism and is that what we are arguing about here?
MR NOBLE: I think the mechanism is agreed, in the sense that in the way that we are conceptualising it, the first —— the person making the choice —— the entity making the choice is an OEM, about what chipset to buy and what handset to market, but they are doing that obviously in the context of other OEMs making similar choices and they are doing it in the context of consumer demand and so in a sense the discretion that they have, I think, is —— one needs to see that in the context of those constraints, that if other OEMs are launching flagship phones with the new generation, then it may be that you do need to buy these products.

You need to buy at least some of them and there is then a question about, well, if you are going to buy them and sell some of them, the question is: who is really then in control of how many get sold? Because I do not think it is quite right to think of the OEM as having a magic lever about deciding I shall sell 1 million 5G and 1 million 4G. In a sense, it is the

other way round. They launch a phone and then the consumer demand to a large extent determines, well, is it 500,000 or is it 1 million that you sell in a particular quarter? You obviously then seek to try and meet that.
MR RIDYARD: The demand depends on the OEMs' prices and quality choices?
MR NOBLE: Yes, precisely.
MR RIDYARD: So can be manipulated in that way.

One thing which I thought was quite useful here was I think it is in Mr Noble's report, where you showed for both Samsung and Apple the kind of profile of how quickly they switched from one generation to another. Do you know, Mr Noble, offhand where that —— I think ——
MR NOBLE: I think you might be referring to the eighth report on page 13, which I think is {POE/21/17}.
MR RIDYARD: So this is ——
MR NOBLE: Is this the one you had in mind?
MR RIDYARD: I had in mind the specific ones for Apple and —— this is Apple, is it?
MR NOBLE: This is Apple.
MR RIDYARD: Right, okay.

So the —— then I think for Samsung the pattern was quite —— we do not —— the pattern was quite different, was it not? It was more —— from what I recall, for

Apple it is a quicker changeover than for Samsung?
MR NOBLE: Yes, that is my recollection. I do not know where the equivalent Samsung one is offhand, but ...
MR RIDYARD: A few pages further on, I guess.
DR PADILLA: You will get similar information, if I may, not exactly identical, but similar information if you look at figures 3 and 4 of my fourth report. That is not about chipset supply.
MR BAILEY: In case it assists, I wonder if Mr Ridyard has in mind, as Dr Padilla referred, to figure 3 and 4, {POE/22/57}. That may be what you are considering, sir.
MR RIDYARD: It was Dr Padilla's report. There is similar information in both places, but I guess I just found the pictures to be easy to see because there indeed you do see that transition.

I mean, for Apple, it is when the transition happened, it is pretty rapid. I mean, Dr Padilla, what do you make of that? One interpretation that Mr Noble would make of that is that it just shows, okay, they have some discretion, but essentially once this new thing happens, Apple goes all in for the new generation, which is sort of consistent with what you might expect from a premium brand like Apple, and therefore the discretion that you are relying on is —— it exists, but it is quite limited in terms of time and maybe the

levers that they have open to them.
DR PADILLA: Indeed and we do not disagree on that, and if you look at, again, table 1 that we were looking at before, you would find that in 2021, which is the timing which you saw this discrete jump in Apple, you know, my analysis does not suggest that there is a wide across generations. It just looks at 5G in isolation.
So when that happens, when the possibility of substitution is so limited, I take it into account. It is 2020 —— 2019 and 2020, which is an important period for the discussion that we will have in due course about conduct because of the Apple 2019 agreement that the discretion existed and there Apple had a discretion to push forward or backwards the day which it was going to compel its customers to switch from 4G to 5G.
MR RIDYARD: Mr Noble.
MR NOBLE: Well, I think it is useful to think about —— I mean, it goes back to the point I was making before about in a sense who is really in the driving seat here. Is it the OEM in the driving seat deciding what it is that the consumer is going to have or is it that the consumer is in the driving seat, deciding what they are going to have? As you say, Apple is a premium brand and I think there is a lot of evidence that appears consistent with the position that they felt they had to

adopt this standard relatively quickly and when they do, as we see in the data, the transition is very rapid from one to the other.
I think with Samsung, one can think of them as accessing different pools of demand, that they have a premium offering of phones which arguably is competing most vigorously with Apple, things like the Samsung S20, and then they have other phones as well, which are arguably accessing different pools of demand. I think we are going to come on to talk about the CMA market —— the ecosystem market study. I mean, that highlights that there are these sort of, you know, mid and low tiers which Apple really is not focusing on and so if one thinks of them as these different pools of demand, then it may well be that actually the low tier —— there is not a willingness to pay for whatever it is, $60 more in cost, plus potentially margin, etc, for a phone to get 5G and therefore consumers do not want it in a sense at that stage.
So I think we really have to think of it in that way, that ultimately who is paying for this technology? I would suggest ultimately it will be the consumer. There is very likely to be some degree of pass—on here and, therefore, there is a cost difference and therefore a price difference and therefore the question is how

substitutable do customers see the 4G and the 5G ultimately?
MR RIDYARD: But do you think that the different patterns between Apple and Samsung that you just described, does that give Samsung greater discretion about how it switches or how quickly it switches or in what proportions it switches from one G to another G in its chipsets?
MR NOBLE: I think there are two distinct questions. There is a sort of threshold question of are you in the 5G game or are you not? I think the evidence, as I read it, is Samsung does appear to have acted in a way that was a threshold question for it. You know, it was the world's first commercially launched 5G handset. That is consistent with someone that wants to be ——
MR RIDYARD: Let us assume that everyone wants to be in the new generation.
MR NOBLE: In that sense, that it is a must—have, they do need to buy some. So the question then is, okay, because you have in a sense a must—have product, how elastic, how substitutable is it at the margin to say, well, I have to have some of these, but maybe I do not have to have so many? I think, again, that comes back to this consumer point of you are offering products to the consumer, are the consumers going to be willing to

pay extra for this more expensive —— substantially more expensive —— this is not a marginal —— you know, even on a $500 or $600 phone, we are talking 10%, 15%, 20% more potentially for a 5G—enabled model, versus a 4G—enabled model because of the delta in the chipset price.
MR RIDYARD: But you could adjust other aspects of your phone to compensate for those differences, could you not?
MR NOBLE: You could. You could, but I think my understanding of the facts is that Samsung offered very similar phones with and without 5G. So they —— and there was then a price difference between the two and so I think conceptually you could be offering a sort of 5G phone but with fewer whistles and bells on it, but, again, I think that comes back to almost how do we conceive of the demand here? Because if we think that the people at least initially in the transition period are the earlier adopters with the highest willingness to pay, then it does seem slightly incongruous that they are willing to pay to adopt a very fast mobile standard but they want to view that HD video on a less good screen than they otherwise would have done.
THE CHAIR: So is there a real difference between Apple and Samsung here because of their different business models? You have Apple, who brings out a product once a year,

and therefore that product has to be the latest standard, and Samsung, who brings out a lot of products, and what does that tell you about the market definition?

MR NOBLE: Well, I would not want to over—emphasise the difference between the two because Apple, yes, they do tend to bring out generations in a single launch event, once per year, but Apple has tried all sorts of different arrangements. It has launched more than one phone at a time. It has launched multiple tiers of phone. Different sizes. Different qualities. It has the SE range which is a sort of slightly trimmed down set of qualities associated with that.

Apple also tends to sell phones. It does not just sell the latest model. It sells last year's model and even sometimes the year before that simultaneously. So it may have a small number that it launches per year, but it does have a tail of phones and therefore both operators do have a range. It is certainly true that Samsung has a much wider range of phones, but, as I say, part of that is driven by the fact that it operates —— some of its phones are at very different price points. They are at $100 or $200. Some of them —— well, until recently, they were not even what you would call smartphones. They were feature phones that in a sense they are very different.

MR RIDYARD: Dr Padilla.

DR PADILLA: A couple of points. One is a factual point. I think my understanding is that actually Apple tends to lag behind others in the introduction of new standards, instead of leading.

The point here is what are the dimensions of substitution for Apple and for Samsung? Samsung decided to release 5G sooner, but it had —— but it did it in small numbers and with a product portfolio that also included 4G. So there is the flexibility that it had when negotiating chipset prices is that it could change the product mix.

In the case of Apple, Apple tends to, contrary to what my colleague Mr Noble says, to some extent guide demand and not just follow demand and when it launches a new generation, it tends to phase out the existing one.

The dimension of flexibility was the timing. 2019/ 2020, I think that time flies, but 5G was starting at that point. The number of 5G networks in the world was fairly limited. In fact, even the true 5G in many places in Europe is still ——

THE CHAIR: I understand your point. Your point is that the dimension of flexibility is different, but in both cases you say that there was flexibility; Samsung by changing

in the product mix, Apple by changing the timing.

DR PADILLA: Correct.

MR RIDYARD: I just wanted to quickly check on what you are saying about Apple —— the distinction between Apple and its ownership of the iOS system compared to Samsung which, as you said earlier, is obviously Android and therefore competes with other Androids. Does that make a difference to any of this?

DR PADILLA: Not really, because I do not think any of us is defining or, you know, in any way arguing for separate markets, iOS or Android.

MR RIDYARD: No. But you did suggest that you thought Apple had less —— faced less intense competition than others.

DR PADILLA: It is likely to and I think that that is an issue that is being debated constantly, to what extent the price premium would support —— and the existence of switching costs would support separate markets, but I think that, as far as I can think of now, for the purposes of the discussion in this case, I do not think that that is material.

MR RIDYARD: That is useful.

MR NOBLE: Just one reference that might provide —— find of assistance, which is from the CMA mobile ecosystems market study. It is paragraph 376. It says:

"We have not received substantive evidence [the "we"

being the CMA] to show that there is a quality difference between iOS devices and Android devices at comparable price points."

So ...

MR RIDYARD: Okay. That is useful.

Then if we can just turn to the sort of analogous question to the one I asked earlier, which is about Dr Padilla's price overlaps analysis. The things you were saying about the price overlap analysis between CDMA and UMTS phones, I mean, it is sort of the same concept that has been used in your comparison of prices between the different generations of phones.

MR NOBLE: Absolutely.

MR RIDYARD: Is there anything more to say on that or is there any difference in the pros and cons of that piece of analysis?

MR NOBLE: I think the pros and cons are, in a sense, similar, whether you are looking, you know, between 4G, 5G, 3G 4G.

MR RIDYARD: I am talking about Dr Padilla's price overlap analysis, where he —— I mean, he has used essentially the same argument and the same analysis, but ——

MR NOBLE: Yes, that is what I meant because I think actually the way —— Dr Padilla will correct me if I misstate this —— the way I understood his actual ——

the spreadsheets to work is that it is all the spreadsheet, it is all the same analysis, it is that, you know ——

MR RIDYARD: Of course, yes, he does not do the two separately.

MR NOBLE: Yes, exactly.

DR PADILLA: The only thing I would point out is that, if anything, the reference to the CMA report that Mr Noble has just, you know, discussed is very relevant because it suggests that the CMA considers that there is substitution at the price point.

MR RIDYARD: Well, okay, yes, possibly. We need to look a bit more closely at everything they said there, which I must confess I have not yet done.

Okay. We talked about —— in the beginning about what relevance does price differences in the chipsets of different generations have. Is there any evidence of —— obviously to do a kind of SSNIP test analysis, one does not so much price differences although I understand they may be relevant, but changes in relative prices over time. Is there anything there that we could have used, because I think in one of your exhibits, Mr Noble, you showed a sort of —— what appeared to be a little spike in the 5G prices and I just wondered whether that threw up any interesting kind of natural experiment, as it

were, to see how the market responded to that price change?

MR NOBLE: Are you perhaps referring to figure 2.3 of my eighth report, which I think is {POE/21/20}? Is that ——

MR RIDYARD: Yes, probably.

MR NOBLE: Is it that spike on the right—hand side?

MR RIDYARD: Yes, indeed.

MR NOBLE: No, I have not been able to analyse that. We have not —— no.

MR RIDYARD: So there is nothing —— I mean, obviously we can only work with the evidence that we have and that includes you as well, but there is nothing we can do here to sort of convert that into an interesting natural experiment that we could analyse?

MR NOBLE: I mean, I think one could try and look. I think the question mark that —— before we get too excited about the spike, is I think, I mean, this chart is, I think, an average. Who is this? I think this is ——

DR PADILLA: If I may, because I think this would save time. If you look at the period where the spike takes place, I think there is agreement between Mr Noble and I that there is a 5G—only market.

MR RIDYARD: Yes, indeed, so it does not help.

DR PADILLA: It does not help us. The spike would have to be in 2019/2020 for that to make a difference.

MR RIDYARD: I will have to reign back my excitement in that case.

I think that covers everything we can usefully talk through on the 3G, 4G, 5G analysis.

I wanted to move on to this question of quality differentiation within the chipset industry because, I mean, this issue seems to come up time after time when we start getting into the sort of —— the nuts and bolts of the alleged abuse. I mean, clearly, you know, there is quality differentiation between the different chipsets and they are complicated products and some people are doing it better than others, but you have both taken the view that at least within a particular category of chipsets, you know, 3G UMTS chipsets, whatever, that all the offerings in the market are in the same market. There is not a separate market for sort of high—end as opposed to low—end chipsets. Is that your position, Mr Noble?

MR NOBLE: Yes.

MR RIDYARD: So what does that —— so that means that it would not be possible for someone who was, hypothetically, a monopolist on high—end chipsets in that category to impose a unilateral price rise above the competitive level?

MR NOBLE: Yes. I mean, the logic flow is that we have

a range of qualities and that if there is a hypothetical monopolist for the high—quality chips, they try and raise the price and, you know, because I am looking at the market—wide level, there is sufficient substitution to the next rung in the quality ladder, which is the thing that they do not control, to constrain that and so on and so on. So it is a chain of substitution.

MR RIDYARD: On the demand side?

MR NOBLE: On the demand side, yes.

MR RIDYARD: Dr Padilla, presumably you are in agreement with that?

DR PADILLA: I agree.

MR NOBLE: I think also —— I mean, the evidence is a bit more mixed the other way round on the supply—side substitution. I think at various times it may have been possible that there was also supply—side substitution, but I think one of the reasons we talk about the quality differentiation is I think there is a question mark about the extent to which there is an ability for suppliers to alter which qualities they are offering.

MR RIDYARD: Yes. You do not need both demand and supply to get you home on the conclusion that you reached on market definition.

So this, in some ways, is kind of jumping ahead and we will deal with this maybe in more detail when we get

to the specifics of the dominance and so forth and indeed the abuse allegations, but how does that impact the sort of leverage that Qualcomm might be able to exert over OEMs? Mr Noble, maybe you should start on that.

MR NOBLE: Well, I think the way I think about market definition, as we said at the beginning, is it is not the be—all and end—all of a case. It is the starting point. It is an analytical tool and I think it is important to recognise, what we are not doing here is defining kind of a homogeneous "good market" and so I think —— Dr Padilla will no doubt speak for himself, but I think we are both agreed there are different qualities. It is an important feature of the market that there are those different qualities. It is very hard to draw lines in the sand between those different qualities and a lot of the ways that you might do that are circular. You know, a high—quality chipset is the thing that goes in a high—quality phone. Well, that is largely circular logic. But I do think it matters to recognise, you know, at various stages in the analysis, that there is a quality differentiator and there is a couple of ways that that makes itself known.

One is when I think when we come, I think on the next section, to talk about market shares, I think it

tells you something about whether you should be focusing on volume or revenue market shares and then I think it also —— it is an important contour of that market when you are thinking about individual interactions within those relevant markets.

MR RIDYARD: But looking at a very specific one. I mean, there is an issue at some point about whether, you know, say, Apple could credibly switch to the MediaTek chip instead of a Qualcomm chip, when Qualcomm chips are no doubt rightly perceived as being high quality and MediaTek ones as being of a less high quality and the argument is made, well, they could not credibly make that switch because of the phones they want to make. So how does that kind of proposition stack up against the conclusion that you reached about the MediaTek and the Qualcomm chipsets being in the same market, being effective substitutes for one another?

MR NOBLE: Well, I think it comes back to the question that if one is looking at the market—wide level across all OEMs, then some of the substitution does not have to involve all OEMs. You can have elastic OEMs in the middle that are willing to make that kind of substitution and you can have less elastic OEMs that are less willing or unwilling to make that kind of substitution. It can then still result in the fact that

when you are looking at this at the market—wide level, that in a sense it is very difficult to then draw lines in the sand that say there is a higher quality market and a lower quality market, but I do not think that is inconsistent with the notion that there can be individual players that might be less willing to make such substitution and other ones that will be more willing to make such a substitution.

DR PADILLA: That would contradict the existence of OEM agnostic markets, I think, but I think that the point I would like to clarify here —— and I think it has come across in a number of questions and answers in previous days —— is whether an input supplier, chipset supplier, is indispensable because its customer wants to design a particular product and sell a particular product. I fundamentally disagree with that, because if that were the case, then each of us would be an indispensable input supplier because somebody decides that it wants to go with Mr Noble or wants to go with Dr Padilla.

I think that the question is whether we are reasonable substitutes. So Apple wanted a particular specification. That was self—imposed. If the price of the chipset —— the high quality chipset is very high, then they could have switched to MediaTek who provides

lower quality but are competitive and tried to compensate in other dimensions and they do this all the time. To the best of my understanding Apple, as of today, does not sell foldable phones. Samsung sells foldable phones. It is a choice. Would that mean that the provider of the glass for foldable phones becomes an indispensable trading partner vis—à—vis Apple because Apple decides suddenly it wants to do that? That is why I think the market that we are defining broadly indicates that there are options and that is why I think that it is very relevant for all that discussion that you were referring to.

MR RIDYARD: Mr Noble, any come—back on that?

MR NOBLE: Well, I think part of this also comes back to, you know, the extent to which you think there is a supply—side substitution, because I think one of the reasons that Dr Padilla and I arrive at similar markets —— part of it is demand—side substitution, but part of it is supply—side substitution as well.

MR RIDYARD: Surely, let us take the MediaTek/Qualcomm thing and this may be a very unfair kind of characterisation, but let us say Qualcomm are good and MediaTek are bad, but still okay, I mean, MediaTek cannot just suddenly think, "I would like to be more like Qualcomm". It is difficult to do that.

MR NOBLE: Yes.
MR RIDYARD: So there is no supply—side substitution there, is there?
MR NOBLE: Well, I think at different points in time, I think Dr Padilla and I agree there is more or less of it. I think in some of the later periods of 4G LTE there do appear to be —— you know, the ability for people to offer high—quality chipsets seems to go up, which is what you would expect as people innovate. So I think, again, it depends quite which time period we are talking about. I think in the earlier time periods, particularly when MediaTek is an entrant, I think your characterisation is more fair.
DR PADILLA: But I do not think that we agreed or disagreed that different qualities were part of the same market, because of supply—side substitution or demand—side substitution. I think that actually we did not —— I do not think that we said anything on that. I think that my view about supply—side substitution is that it needs to be always taken with a pinch of salt, in that there is this famous statement by somebody from the Commission, I do not remember now, saying: you know, we used supply—side substitution for market definition when it makes no difference, which means, you know, you have to be very, very cautious.

I think that there is demand—side substitution here and I think that that is what drives the market and everything that I said before applies.
MR RIDYARD: Okay.
I think that takes us to the end of the section on market definition. I think we said to the parties that there will be a chance for the advocates to raise just questions of clarification at the end of each section.
MR MOSER: We do not have any.
MR SAUNDERS: Nor us.
MR RIDYARD: Perfect clarity. Excellent.
Right. So we will move on to the second topic, which is the question of dominance. Our first subtopic on that is just looking at market shares. The parties have very helpfully both provided your summary market share numbers. I guess the first question —— maybe Dr Padilla —— is there any important difference between —— obviously you look at the market in different ways, I understand that, but is there any difference between you on the actual numbers that you are using?
DR PADILLA: Market shares are high under both definitions and so the discussion about dominance is fundamentally about other dimensions than market shares.
MR RIDYARD: But there was nothing in the other side's market share numbers that you thought were incorrect?

Obviously you look at it in a different way, you say they are asking the wrong question, but the answers they have given are okay as far as you are concerned?
DR PADILLA: If any arithmetical error, I would have flagged during our discussions in the joint expert statement.
MR RIDYARD: Mr Noble, are you the same?
MR NOBLE: We did not detect any arithmetical errors.
MR RIDYARD: Okay.
So then, I mean, Dr Padilla, you just said some of the market shares are high. Clearly that is the case. So then there is a question about what use we make of market shares in an industry such as this. I think you make the statement that —— you have already just said it really just now —— market shares do not provide a reliable indicator of market power, in an industry such as this. I am not surprised to hear you make that argument, but what does it mean? What is it specifically about this industry that causes you to reach that conclusion?
DR PADILLA: So on the one hand I think that there is the bidding market dimension that we were discussing before. If you look at market shares, they are driven by the evolution over time and the numbers are driven by this competition for slots that we were discussing before. You know, when Apple decides to go with Qualcomm, then

Qualcomm's market share jumps tremendously. Does that mean that Qualcomm has a lot of market power or does that mean that Apple had a lot of buyer power and made a decision to purchase from Qualcomm as opposed to from somebody else?
So I think that that is one characteristic that is important.
The second characteristic is that when we are measuring market shares, whether in volume or in value, which I do not think that it makes a difference in this case, we are looking at volume —— sorry, at market shares in the market. We are not looking at capacity in market shares. That may have an impact. You know, when we say Qualcomm has X% of the market, MediaTek has X% of the market, we are looking at the volumes that were transacted or the value of the volumes that were transacted, not the capacity to serve the market. Capacity here is actually fairly unlimited, not really constrained because we are talking about fabless chipset sellers, which means that if Apple had decided not to go with Qualcomm but had decided to go with MediaTek, MediaTek most likely would have been able to serve that demand and then the very high market share would be on MediaTek.
So ——

MR RIDYARD: Sorry to interrupt. We do not really know anything about the fabs. Someone is making these things somewhere. We do not know anything about the fabs' capacity, do we?
DR PADILLA: So we are talking about TSMC and Global Foundries, basically. These are the two companies that produce those and, look, if the volumes that TSMC was going to manufacture for Apple go to MediaTek ——
MR RIDYARD: That is just moving the same numbers around.
DR PADILLA: —— and therefore if it had capacity for Apple, it had capacity for MediaTek.
THE CHAIR: So the same foundries are making the chips for both?
DR PADILLA: To the best of my understanding, yes.
MR RIDYARD: That was a bit of a digression, but useful.
Sorry, just before we move to Mr Noble, Dr Padilla, so the features that —— the specific features about this industry that mean we should not be worried about or should not be interested in market share or we should not be unduly influenced by market shares or what exactly?
DR PADILLA: So the bidding characteristic, which means that you are going to observe very significant fluctuations that are driven by demand decisions as opposed to capacity constraints or product differentiation and,

secondly, as I mentioned, the fact that there is the ability to expand for existing players their volumes significantly in response demand decisions.
MR RIDYARD: Right. Mr Noble, your response on that because I think you expressed, obviously, the contrary view which is that this is not an industry where we should disregard market shares.
MR NOBLE: Yes. I mean, I think market shares are useful. I think one should see them in their context in all cases and not simply just take them as read, but I think there are two things to note here.
One is that they are high and the other is that they are persistently high and so if they were high but in aggregate fluctuated very substantially, then I think that might tell you one thing, but that is generally not what we see. What we see is that Qualcomm's market share is high at all times, or most times. I think, I mean, I do agree with Dr Padilla about the ability to expand. There may have been time periods that there were restrictions. I think during the coronavirus pandemic, for example, I do think there were some challenges. I think some of the lead times on some of these fabs became very, very long so I do not think it is quite right that it is always sort of complete flexibility on capacity, but I do not —— but I guess

what I think is not disputed is that it is —— the chipset makers are all fabless and therefore they are all outsourcing their manufacturing in some way, shape or form and they do all seem to be calling on a common pool of fabs to make those chipsets and so, as Dr Padilla said, if one fab is not —— you know, was making Apple one day, it might make Samsung the next.
DR PADILLA: If I may, I would like to disagree with my colleague about persistency and, sorry, I do not have the reference to the file, but I would like to take you to figures 5 and 6 in my fourth report, if at all possible, pages 75 and 76 respectively.
MR BAILEY: It is at {POE/22/78}.
MR RIDYARD: It is useful to look at these. What do we see?
DR PADILLA: There you see in the red lines what you have is Qualcomm's share of all customers for the products that, you know, I consider part of the market —— the Apple market. The blue line would be Qualcomm's share of Apple's chipset purchases.
MR RIDYARD: Yes.
DR PADILLA: So the blue line gives you what Apple bought from Qualcomm, what is the share of its chipsets that it acquired from Qualcomm. The red line is telling you actually it could have bought from others and if it had bought in proportion to the market, that would have been

Qualcomm's market share.
This red line actually overestimates or underestimates the competitive constraint because it does not take into account this fabless dimension that we were mentioning before, meaning that MediaTek and others could have produced more, but I think that the point I want to make here is that there is no persistency and you can see how —— if you go to the next figure, perhaps, even more clearly, you can see how {POE/22/79}, the decisions of Apple contribute to Qualcomm's market share. Here, in blue, you have Qualcomm sales to other OEMs and then you have, in red, Qualcomm's shares to Apple. You can see that, absent Apple's purchasing decisions, there is a downward trend in the blue line and it is when Apple decides to go for Qualcomm that Qualcomm's shares jump up quite significantly.
So I am not saying the market shares are irrelevant or provide no information, but I think that we always have to distinguish whether the market share is telling me who is best or whether they are telling me that somebody has market power. I believe that Apple was choosing Qualcomm because it was best and that Qualcomm's market share was high because it was the best option, but that does not mean that it had market power

because Apple could have made different decisions in a market where substitution possibilities exist and then market shares would have been completely different.
MR RIDYARD: Well, okay. Mr Noble.
MR NOBLE: Well, I wonder if it is possible to look at the Class Representative's market share table because of course this is calculated on Dr Padilla's market? I do not know —— I do not actually have that reference to hand.
MR WILLIAMS: Do you mean this week's note or do you mean the report?
MR NOBLE: Yes.
MR RIDYARD: While we are waiting on that, Dr Padilla, on your red and blue lines, I mean, the blue one was jumping around sort of zero to 100 for Apple, but that is not your description of the market, is it? That is just Apple's purchases within the relevant market, as you have defined it?
DR PADILLA: Yes, correct.
MR RIDYARD: Yes. It is in your eighth report, is it, Mr Noble?
MR NOBLE: No, this is the Class Representative's note that the Tribunal asked for that came, I think, was it, Wednesday?
MR SAUNDERS: It is {X/2.1/1}.

THE CHAIR: Can someone provide a copy of that to Mr Noble and Dr Padilla {X/2.1/1}. Is it on the screen now?
MR NOBLE: It is on screen.
If you go on to the next page {X/2.1/2} and then the one after that {X/2.1/3}. Yes, it is this.
So this provides the revenue market shares on the left and then the volume market shares on the right for each of the relevant markets that are defined. Certainly, as I said, in the way that I have defined the market, what I observed from this table is that Qualcomm has a very high and a very persistent market share, you know, across all those markets.
DR PADILLA: Well, Mr Noble, if we go to your second column, LTE–UMTS–GSM goes down from 100% to 50% in value, or in volume, and in value 67%.
MR NOBLE: Yes, although I would say that ——
DR PADILLA: I do not think that you or I would like to lose that market share and we would be able to defend to our shareholders that that was ——
MR NOBLE: Well, what shareholders care about is the revenue and they are still capturing 67% of the value and I would say that it is important to note that in these tables, some of these are quite —— some of these market shares are quite difficult to estimate because a lot of the data we have does not distinguish very effectively

between UMTS and CDMA chipsets in those two columns. It often just elides the two and so, in a sense, it is at least 66 and at least 67, for example, in 2017 and 2018 because we have made assumptions there that Qualcomm has 100% of the market in CDMA, which obviously it does not, but we did not wish to overestimate those numbers.
MR RIDYARD: I understand that.
DR PADILLA: But the question here in relation —— in comparison with my blue line/red line analysis is, and I do not know, Mr Noble, whether you know these figures, what would be the market shares if you removed Apple and Samsung?
MR NOBLE: Removed them? I would not know offhand.
MR RIDYARD: But is that even a valid question to ask because if you remove —— I mean, if you remove them, what does it mean? I mean, if you remove Apple from the face of the earth and see what happens or ——
DR PADILLA: It is exactly the same point that I made before. So I would not say that that would be the right market share, but I am trying to interpret whether market share is driven by Qualcomm's power or is the result of decisions made by consumers and that is the bidding market dimension that I mentioned before.
MR RIDYARD: Yes.
DR PADILLA: So Apple could —— if Apple could have chosen

somebody else, then that market share would have migrated immediately, which is very different from a situation in which market shares are stable over time as a result of an aggregate of various —— many decisions of individual players, subject, for example, to switching costs, where you can see that is market power, but here it is to some extent a decision of a large or a couple of large buyers that represent a very significant chunk of demand at that point.
So it is not about a calculation of market share; you would be absolutely correct, it is about interpretation.
MR NOBLE: Yes, although I think the caveat that I would highlight there is that Apple becomes a large OEM late, in the later years. In the earlier years that we are talking about here, I mean, they only started making a phone in 2007 so they are not a large OEM then. They are barely an OEM at all. So Apple does grow and grow and grow. It has been a very successful company, but I think it is not right to think of Apple as always sat there with 30–something per cent market share. You know, it may have that now, but it certainly did not back in 2010, for example.
It is similar for Samsung. The market as a whole was generally much more fragmented in earlier years than

it is in the later years. You know, lots of entities, like, well, Nokia and then it becomes Microsoft Mobile, you know, Ericsson, Sony, etc, are all active and we heard from BlackBerry and from Lenovo about their activity in the market. Many of those players have now exited over time.

MR RIDYARD: I think we have a sense though of the core answer to my question about what is it about this that you would —— where you would say the market shares do count and it is really this difference of view about persistence. I think that is the core difference between you.

MR NOBLE: Yes, I think that is the essence of it.

MR RIDYARD: What about something that was touched on briefly by Dr Padilla there about the difference between value and volume? I think it is your position, Mr Noble, that in a differentiated product market, it makes best sense to look at value shares. Is that something you disagree with, Dr Padilla?

DR PADILLA: I think that in this case there is an issue about the quality of data, but, frankly, I do not think that that is material. So I think that I have provided numbers with volume, volume market shares, and I have provided value market shares.

MR RIDYARD: But I thought you had a distinct preference for

volume shares?

DR PADILLA: Because of the —— as Mr Noble was mentioning, calculating market shares is complicated and I think that it is easier to do it here with volumes, as opposed to with value.

MR RIDYARD: So just because it is easier, not because it is better?

DR PADILLA: I think that I do not have a strict preference for one or the other in this particular instance.

MR RIDYARD: Mr Noble.

MR NOBLE: I mean, from my perspective, the easy market shares to calculate, in inverted commas, are the 3G CDMA and 5G because the datasets we are using, it is relatively clear which chipsets are which. The hard ones are LTE—UMTS and LTE—CDMA because some of the datasets are just not very clear and so you have to make these kinds of assumptions. So that affects the extent to which one can be sure that you have the right number in those particular columns, but I do not think it particularly affects the extent to which the value or the volume columns are the right ones to look at because once you have solved that problem of identifying which chipset is which, I do not think there is a lot of lack of clarity about what the number is. The numbers are in the dataset.

I think it is also quite clear from the earlier conversations that, you know, potentially it is a dispute of fact about whether or not higher prices were charged for CDMA, the CDMA adder, for example, but, assuming that they were, then I think that, for me, is a quite important factor in steering us one way or the other because it does suggest that the revenue numbers might be capturing both quality differences, which are important in a market where we all agree that quality matters, but also where there is a question mark about does someone have market power and, you know, the presence of something like a CDMA adder is consistent with that and therefore I prefer a measure that captures those factors.

MR RIDYARD: Yes.

Let us move on to my next sort of subtopic, which is the question of entry areas and constraints on chipset pricing. You both talk a fair bit about entry barriers and the existence or non—existence of them in your reports and in the joint report, but I would like to start with a very basic question, which is what is an entry barrier because I did not see either of you tell me what it was? Maybe I should know by now, but ——

DR PADILLA: That is a very hard question. I will tell you what I think, but I think that there is disagreement

amongst economists about what this is.

My view is that we are talking about hurdles that the entrant incurs or faces that the incumbent does not and, to be more concrete, fixed costs that are incurred on a recurring basis, by both incumbent and the entrant, are not a barrier to entry. It is part of the cost of doing business. Fixed costs or any other sunk costs that the incumbent has already incurred and does not need to incur again and the entrant faces at the entry point, these are entry barriers.

MR RIDYARD: So it is asymmetry between the incumbent and the entrant?

DR PADILLA: Right. In support of that, I would quote the paper of Mankiw & Whinston, RAND Journal of Economics 1996, which looks at prices in free entry/free exit and the pricing free entry/free exit is, by and large, the long—run average incremental cost, which means that those fixed costs are part of the free entry/free exit scenario and those are fixed costs that are incurred both by the incumbent and the entrant.

MR RIDYARD: Mr Noble, where are you on entry barriers?

MR NOBLE: I mean, I think for me the critical issue is really about the sunkness of them. So are they sunk costs? So, I mean, if we go and look, for example, at the CMA guidelines, it talks about entry barriers

arising where an undertaking has an advantage over a potential entrant and I think, in Dr Padilla's definition, he highlights the distinction between a sunk cost and a non-sunk cost and I think that is often a critical distinction between the two because it can then create an asymmetry between the incumbent and the entrant.

MR RIDYARD: I think you are agreeing then, are you, with your working definitions?

MR NOBLE: I think so. I mean, I was going to cite a different paper, but I do not know if we want to trade too many academic references. There is a Baumol & Willig paper that is quite interesting on this, but I think the sunkness is, I think, in the context of this case, the most important aspect of entry barriers.

DR PADILLA: I would say to clarify my position because I think that we are very close but not exactly identical in the way that we have formulated. Suppose that following entry, so T plus 1, entry happens at T, and T plus 1, the entrant and the incumbent are both -- or both need to incur in sunk costs, for example advertising costs. If there is no asymmetry, that is not a barrier to entry. However, if advertising made by the incumbent in T minus 1 or T minus 2 has created a stock, a brand value, that will create a barrier to

entry, provided that that brand value, that stock, you know, carries through over time.

MR RIDYARD: Okay.

MR NOBLE: I think maybe there is not a gap because I would agree with that.

MR RIDYARD: You agree with that?

MR NOBLE: Yes.

MR RIDYARD: All right. We will circle back to that, I think, as we go through some of the entry barrier headings in the next few questions. Thank you for that.

THE CHAIR: I just wondered whether, before getting into a new question, which might take a little bit of time, it would be better to stop now and return at 2 o'clock. Thank you.

(12.58 pm)

(The luncheon adjournment)

(2.00 pm)

MR RIDYARD: We are going to continue talking about entry barriers. I want to ask next about the benefits of larger scale operation, given that there are some quite big differences in the sizes -- or very big differences in the sizes of different players.

Mr Noble, do you consider that scale effects give rise to entry barriers in this industry?

MR NOBLE: Entry barriers for chipset manufacturers?

MR RIDYARD: Yes.

MR NOBLE: Yes. Yes, I think they do.

MR RIDYARD: How?

MR NOBLE: Well, I think it is because you have very, very large-scales of investment and if we go back to our discussion earlier about what is a barrier to entry, the fact that something is big on its own is not enough, but in this context the evidence that I have seen signals that when people are investing in cellular technology, or cellular R&D, that is essentially a sunk cost. You know, it is specific to cellular and therefore they are sinking that cost relative to that industry and there is a particularly useful quote -- I think in my eighth report -- so it is at {POE/21/43}, and it is in the footnote at the bottom. It is the Broadcom quote there. I do not think that is confidential. I do not know. I will not read I out.

MR RIDYARD: That is fine. We can look at it.

MR NOBLE: So the way I read this is that it is saying there is billions of dollars of investment needed and it is specific to cellular baseband technology and therefore -- and therefore it is sinking it into that industry and if you were to exit that industry, then essentially it is stranded or largely gone.

So that is the -- I think that is the first point.

I think the second issue is about -- and I think we have this -- I do not know whether we want to cover now, the economies of scale.

MR RIDYARD: Yes, of course.

MR NOBLE: But there is the economies of scale because, of course, if you are sinking a very large amount of money into something, then in order to -- for that to be a rational thing to be doing you have to expects you are going to acquire a significant enough amount of sales in order to make that worthwhile and, therefore, the very large-scale of these investments, potentially, means that you have scale effects that you need to be able to acquire a significant -- a significantly large chunk of sales in order to make that worthwhile in the first place.

MR RIDYARD: I can see the first one, you know, fits -- seems to fit very well with the notion of asymmetry because an incumbent has already incurred the R&D costs and I am sitting there, thinking, "Shall I do it tomorrow?" You are saying that is an asymmetry because the other guy has already done it and I have not yet.

In the second one, I mean, we can both be sitting side-by-side considering entering a market and it will cost us both a lot in terms of getting into the market, but the one who ends up with the 80% market share would

get a pay—off and the one who gets the 20% market share, would not get enough to pay off, but that it not an asymmetry ex ante between those two players.

MR NOBLE: No, it is not an asymmetry ex ante, but there is a distinction between, say, two parallel industries where you are considering that example. One industry where you have atomised buyers, in a sense, you would not necessarily think scale effects on their own are the, you know, be—all and end—all. They are almost the other side of the coin of the largeness of the investment that, you know, in order to make it worthwhile you have to get a lot of scale, but there is potentially an additional barrier created by the fact that if the scale becomes lumpy, it can then become more challenging, in the sense of if I do not win a certain number of big customers, if I do not build my brand sufficiently, then it can become more one/zero than actually I have to pass some threshold, I have to pass some brand test, I have to pass some quality threshold in order to be taken seriously in this industry and of course when you have lumpiness in that, that potentially on its own becomes a further barrier, because of course it is a bit of a dice roll that you have to take. You make that investment and it is very hard to get very, very small increments of sales. You have to get

moderately sized ones.

MR RIDYARD: Has your rival already rolled the dice and rolled a 6?

MR NOBLE: Well, in this particular instance, I think we are looking at an instance where —— we heard some of the factual evidence. Qualcomm has been in this industry for a very long time and so it has already built up a reputation of high quality and so really the question mark here is: how can someone enter? How can someone be credible to rival someone like Qualcomm, or another incumbent that has also done the same sort of thing? For me that is the question about the entry barriers. It is not just about Qualcomm, but it is about other incumbents that have gone on that journey.

I think a third point to highlight here is also the repeated nature of this, the fact that most of what people want to buy is multi—mode phones —— sorry, multi—mode chipsets, and so it means that by the time we get to 3G, 4G, 5G, the incumbent has already sunk investment into the earlier standards. Qualcomm was effective in LTE —— sorry, in UMTS and CDMA 2G and then it can build on that success because it has already built good chipsets there. When it enters the next round, it has already started with the skills and technology and know—how in order to do that. It is

investing in the increment of doing the next round of technology, but we know that the OEMs want these multi—mode options so that they can operate across multiple standards.

MR RIDYARD: That is not a fresh roll of the dice.

MR NOBLE: It is a loaded dice in a sense, yes. It is not guaranteed that it will be successful, but in a sense it gives it an advantage, an asymmetric advantage that a non—incumbent does not have.

MR RIDYARD: Dr Padilla, plenty of material there for you.

DR PADILLA: Yes, I am in agreement with some of it and in disagreement with some of it as well.

So, the first thing, are there economies of scale in the industry? Yes, there are economies of scale, especially with respect to R&D. I mentioned before you need to amortise the R&D cost that incur and therefore, not surprisingly, you are going to have always a limited number of players and this is not just true for chipsets and for mobiles, but in all semiconductor markets. So that is the case.

Now, are these economies of scale sufficient to prevent entry? The evidence there suggests "no" and what is the evidence? The evidence is that there is always a first mover advantage —— a first mover. Qualcomm has been typically the first mover in 3G, LTE

and 5G, and its market share over time declines. If the market share over time declines, it is because, unfortunately, there must be somebody that has entered and has taken some of that market share.

Of course you are not going to see entry by multitudes. That is not going to happen because of the economies of scale that I mentioned before. You are going to have entry by one or, at most, two players. This is what we have observed. MediaTek entered and took market share out of Qualcomm in all those product spaces.

Why? Because to a large extent your success yesterday is independent of your success today. You need to keep investing and innovating in order to remain a credible player in the market.

MR RIDYARD: Sorry, those are two different statements though. I mean, yes, you need to keep investing, clearly, but is it true that your success today is independent of your success yesterday?

DR PADILLA: Well, completely independent it cannot be because you build a reputation, etc, but, look, the reputation did not save Infineon from going down in the market because it was not able to keep up in terms of investment and quality development. The reputation of Intel, who else, was not enough to keep them alive in

the market. You need to invest very significant amounts of money on a continuous basis in order to retain a position in the market, a place in the sun.

Therefore, you know, again, it is not zero/one but the entrant can take market share and it does take market share and it may take some time.

It is important also to note that the entrant can choose the scale of entry and typically what you do is you enter at certain scale, you build some reputation and then grow from there. This is possible because, as we were discussing before, once you are in, actually there are very limited economies of scale at that point in terms of production and manufacturing. The real hurdle is to invest. As I mentioned before, the asymmetry —— there may be an asymmetry, but it is not, according to the evidence, so large that it has prevented entry.

Therefore, any company has to keep it on its toes and doing what? First, obviously, keeping their prices at reasonable levels and be investing and the investment that we see here in terms of revenue over —— and indeed over revenue are very large.

The last point I will make, just last point. Note that there is a sponsor entry. So we are talking about a market where there is also concentration on the other

side and we have seen the importance of Apple and Samsung, which, for example, in the case of Qualcomm, may represent 50% or more of its sales. As we have seen in the file, Apple sponsored the entry of Intel in 4G and it contributed therefore to compensate for some of the advantages that Qualcomm had initially. This is a very, very good example, not only because it was a sponsor entry but because you could see that clients are not necessarily exclusive. So, in that instance, Intel enter with some products and eventually grew to dominate the 4G demand of Apple.

MR RIDYARD: Next, just to follow up on the actual physical production through the third—party fabricators. Do we know anything about the economies of scale there?

I mean, do we know that a large order gets a lower price than a smaller order? I have not seen anything on that.

MR NOBLE: I do not think we know.

DR PADILLA: I know because I have been working on that industry and I have been —— but it is not in the record.

MR RIDYARD: That is fine.

MR NOBLE: If I might just add a couple of very brief points on what Dr Padilla said.

I think one interesting point one needs to consider is the —— there is some other factual evidence that I think helps us understand whether or not we think

there are significant barriers to entry in the sunk cost way that we have described them. Another quote that I would highlight from my eighth report is at {POE/21/45}. It is at the top of the page. This is a quote from Intel describing that acquiring an existing player in the industry was the most expedient way to enter into the LTE—CDMA segment and I take that as consistent with the idea that there is essentially a time dependency here that, you know, incumbents of the past have some advantage over the new entrants of today and Intel, in a sense, has to become hybrid. It sort of partially enters in some of the industry, but it has to or at least it describes here that its strategy was to acquire an existing player in order to achieve —— overcome those entry barriers in the CDMA segment.

I do not know if we were going to talk about the history of entry and exit now or if that is something we should come back to?

DR PADILLA: Just one point, if I may?

MR RIDYARD: I will come back to that.

DR PADILLA: Entry for buyout is a form of entry. It means there are assets there that are not controlled by the incumbent and you enter so I do not see that point.

MR RIDYARD: So you might even argue it was a short—circuiting device to reduce possible asymmetry?

DR PADILLA: Right.

MR RIDYARD: Okay. Let us come on to the actual history of entry and exit because there is —— obviously there are very high shares at any point in time, but then there are also changes in the personnel in the industry. I mean, Mr Noble, I think you make comments in the joint report about how the exit of certain players shows that there are barriers to entry, but, I mean, does that follow or should we be taking a more optimistic view about the industry, given, as Dr Padilla says, people come and they go?

MR NOBLE: Well, I think we do see evidence that people go. That is clear. People like Broadcom, for example, have exited the industry. I think there is a question mark about how many people we have seen come, because I think there is a debate about is Intel a pure new entry or is it a sort of hybrid, because it is buying an incumbent? VIA before that purchased the CDMA business of LSI in order to, as I understand it, to be credible in that space. You can see that, for example, in the history of some of the non—assert agreements that they get handed over.

So I think we do know there is exit and we do know that there is at least —— there is evidence that is consistent with the idea that there is this time

dependency. There is some entry, I think that is undeniable. MediaTek, for example, I do not think, they appear to be a fresher entrant and there is also some other entry, I think, in the 5G era, although it is more of the self—supply nature because this HiSilicon, which is closely associated with Huawei, and I think there is also a question mark about that because there is the whole geopolitical debate about, well, HiSilicon essentially is not really an option for western mobile manufacturers because of the US Government stance on Huawei and its associates and so there is a question mark about, well, in a sense, if that was not there, would HiSilicon have entered in quite the way it did? Is this almost a —— is it a self—supply through necessity because Huawei otherwise is not —— cannot guarantee itself access to these chipsets because it may be blocked geopolitically, as opposed to on an economic basis?

So, yes, they do overcome that entry barrier, but it may be for other reasons than we are focused on here.

MR RIDYARD: In parallel, if you are talking about 5G, both Apple and Samsung have, by now at least, reached a position in 5G through doing it themselves, rather than relying on the market.

MR NOBLE: Yes. Samsung certainly is a credible

self—supplier and the —— Apple though essentially buys Intel's chipset business and the question mark then is, well, it does take it a very long time, at least seemingly, to convert that chipset business into something that can provide it with a 5G chipset which I think is a signal about, in this instance, the size and the complexity of undertaking that kind of investment, even though, in a sense, it is sat there with a waiting customer, its own integrated handset business.

MR RIDYARD: That shows that it is hard to do it and get it right.

MR NOBLE: Yes.

MR RIDYARD: And it takes some time.

MR NOBLE: Mm—hmm.

MR RIDYARD: Are you concerned about what happens in the meantime? Is that your ——

MR NOBLE: Yes. I mean, the fact that something takes a very long time is not in and of itself, at least for the very period that it takes, a form of entry barrier because it says, well, during that period someone potentially has market power as entrants try and ramp up, you know, solve whatever technical problems they might have. You know, that period of time is a window in which they are not yet acting as a discipline on the

incumbent.

MR RIDYARD: You can make the same comment about MediaTek. You know, it takes a while for it to try and catch up with Qualcomm in whichever segment you are looking at. Do you have any observations on that, Dr Padilla?

DR PADILLA: Yes, a few.

First, I do not think that there is any dispute between us that there is no hit—and—run entry. Entry cannot happen overnight and that is why, you know, if we would not argue there is supply substitution here, but when we consider entry, we typically consider a period of time, one or two years. Why do we do so? Well, because dominance, at least as I understand it, is the ability to sustain prices above competitive levels for a period of time, not one day or a month or two months, because when you think that somebody can enter in a year or two, you are going to discipline yourself because otherwise all that you are going to do is annoy your customers today and then throw them in the hands of the entrant when it finally comes.

So entry has a discipline effect, not only when it happens but when it is clear that it will happen or can happen. So I think that that is important.

The second point is that what we see is a few instances of exit. We see some failed attempts to enter

and we see at least a very successful entry story, which is MediaTek, which eventually became leader in 3G, 4G, 5G, by 2023 even leader in 5G, but we see other instances of entry. As you pointed out, there is the expansion —— more than the entry, the expansion of Samsung and the entry for buy—out, among others, of Apple. If I am not mistaken, the iPhone 17 Pro sells with an Apple chipset, the A19.

That is a new player. It did not enter buying some of the assets of Intel. Quite frankly, it did so because Intel was a failure and so instead of propping up Intel, what it did is it acquired and developed its own capabilities, but now, when Qualcomm deals with Apple, it is going to have to face the competitive constraint that is imposed, not just by MediaTek, but also by the self—supply you know of ——

MR RIDYARD: But in that case, a five—year gap between the acquisition of the Intel business and actually producing 5G chips, is that —— at what point does the delay become so long that you say ——

DR PADILLA: That is a fair point. I would not recall when they bought Intel, to tell you the truth.

MR RIDYARD: 2019, I think. Do not trust me on that.

DR PADILLA: I would not be able to tell you. I would not be able to tell you. I do not remember now what was the

period of time for which the duration of the contract —— the contract with Qualcomm, but I do agree with you that time matters and if we go beyond two or three years, then it is less of a constraint than if we are in one or two years.

Think about the cumulative effect. I think that MediaTek has started winning market share much more quickly. 2023, it is leading in the market. Samsung was there.

MR NOBLE: I guess one other point that I would note in this regard is I think there is a signal in the fact that incumbents feel —— sorry, chipset buyers feel the need to sponsor entry because when you talk about industries that do not have very high entry barriers, you do not even trouble yourself with debating whether people have to sponsor entry because people organically overcome them. Why would an incumbent —— a large buyer go to the trouble of guaranteeing sales to an as—yet unproven supplier?

They typically are incentivised to do that because they recognise the fact that if they do not do that, then there may not be entry and why would there not be entry? Because there are entry barriers in the first place.

DR PADILLA: I am not sure that I would agree with that, to

tell you the truth.

MR RIDYARD: Sorry, Dr Padilla, the act of sponsoring entry is the act of overcoming those barriers, is it not?

MR NOBLE: Yes, it is, but I think, as I said, it is the fact that you have to go to the trouble of it that tells you that the entry barriers are there in the first place and there is then a question of how effective are you at sponsoring that entry? So you try and sponsor the entry. You try and help the rival leap the hurdle and perhaps they do, in the sense then that at the point they leap that, at least there is one more supplier than there was before, but if they do not or it takes them longer than you expected, then in a sense what it has told you is (a) there was an entry barrier to start with that you were trying to overcome and (b) it is perhaps very hard to overcome it because, despite the sponsoring of the entering, there is then either no entry or it is a very prolonged entry period.

MR RIDYARD: Dr Padilla, I interrupted you.

DR PADILLA: No, no, I interrupted you actually and apologies for that.

I was going to say that, no, I do not think that is the case in that, you know, entry involves some costs and it involves some ingenuity. You may lack money or you may lack ingenuity. When somebody buys you, it may

be because it wants to provide you with the funds that you lack or because it provides you with ingenuity that you lack, but ingenuity is not a barrier to entry. It is unfortunate that not everybody is able to develop the same products and services and I think that Apple brought ingenuity, capability, creativity and not only funding, because I think that, frankly, Intel has good access to the capital markets in the US and it appears also to the US Government to get the funds needed in order to invest, especially, you know, now perhaps it is going through difficulties, but it will go back in time.

MR RIDYARD: Okay. Just to move on slightly, and that is the notion of economies of scope. I think at that one, Mr Noble, you indicated you thought there were economies of scope in this industry. Is that a part of —— is that an immaterial part or is that an important part? Did I just imagine the whole thing?

MR NOBLE: No, I think you did not. I just want to check exactly what I said because I think ...

No, yes, this is paragraph 3.36.

MR RIDYARD: In the joint?

MR NOBLE: {POE/21/49}. Is that the part you had in mind? No, maybe —— sorry, 48 {POE/21/48}. I am on the wrong page. It is 3.37. If we go back a page.

MR RIDYARD: Can we go back one page?

MR NOBLE: I think this is the point you are referring to because I talk part economies of scope. I think I was using that somewhat synonymously with the point about the multi—mode point that I made earlier on about the fact that because you have provided a history of —— you are a proven entity in GSM and in CDMA one, then that helps you with the next round of standards. Yes, because it is in a sense ——

MR RIDYARD: It has an ascendancy.

MR NOBLE: Yes, exactly. It is almost what the multi—mode chip is, it is a GSM chip and it is a CDMA one chip and it is a CDMA 2000 chip all in one so one can conceive of those as an economy of scope. Over time, that then becomes an incumbency advantage, because of course these standards arrive over time. Initially, there is just GSM and CDMA one and then we have those two, plus two more, and then, again, we have those four, plus a fifth one, which is 5G. So I think that is —— that was how I meant that.

MR RIDYARD: Yes.

DR PADILLA: Again, not zero/one. I would admit that there may be some economies of scope related to reputation, but I think that the evidence in the market suggests that those economies of scope are not determinative and the reason is because if they were so insignificant, you

would have a lot of parallelism in the market structure irrespective across standards and, you know, you would not have movement in one standard, whereas in the other there is not that much movement in market share. So there may be some, but I think that they are limited and they have not prevented the emergence of players in each of the different generations.

MR RIDYARD: So let us move on then to the consequences of your —— I mean, clearly you have somewhat opposing views on the existence of barriers to entry. Let us look at how that impacts on the view about Qualcomm's market power.

I mean, Mr Noble, in your view, does the existence of entry barriers or other factors, does that allow Qualcomm to set chipset prices significantly above the competitive level?

MR NOBLE: It gives it the potential to do so, yes.

MR RIDYARD: If you have the potential, why would you not use it?

MR NOBLE: I mean, this goes back to the conversation we had earlier on, which is about whether or not if you have market power, what do you do with it? You could set a high chipset price or you could seek to leverage that market power into a royalty rate, or you could do a bit of both.

MR RIDYARD: And then, Dr Padilla, we are back in the Goldilocks territory here which you commented on earlier.

DR PADILLA: Yes.

MR RIDYARD: Just to be clear, Mr Noble, your position is that they choose —— Qualcomm chooses to maybe exercise a bit of market power by charging somewhat higher —— excessively high prices in chipsets, but mainly using it as a lever in the theory of harm about denying access to FRAND arbitration?

MR NOBLE: Yes, exactly. The Class Representative's theory of harm is that they take that market power which I say they have in the chipset market, and it varies exactly which one, but they then gain a benefit from that by too high a royalty rate.

MR RIDYARD: They do it by deliberately choosing not to exploit it properly in chipsets but to use it elsewhere? Is that how it works?

MR NOBLE: Yes. I think to be economically coherent, they need to do that because if one believes in one economic rent, then you cannot have that rent twice. You cannot simultaneously take a very high chipset price and have a high royalty rate. That would not be a coherent theory of harm.

MR RIDYARD: But why do they —— I will give you chance in

a minute, Dr Padilla, but why do they choose to cash in through that mechanism, rather than just charging high prices for chipsets? Is there any difference really?

MR NOBLE: Yes, I think there is, and it is to do with the nature of the entry barriers. We have talked here about, you know, a chipset market where the entry barriers are in a sense natural entry barriers. They are created by the features of the industry, you know, the complexity of the technology, the size of the investment, the sunkness of that investment. The entry barriers in SEPs, they are statutory. They are created by law and the —— so, in that sense, it is not possible for someone else to enter and be a competitor to the specific SEP, once it is declared a standard essential patent, and assuming that they really are valid patents and that they are really infringed and they are really essential, assuming all of those characteristics are met, then in a sense there is a statutory barrier to entry saying that other people cannot compete for these SEPs, they are quasi government awarded monopolies.

THE CHAIR: I just do not understand this because you are saying that they are doing two things. One is that they are leveraging into a market where they have even more barriers to entry, 100% market share in a SEP market, and, secondly, they are leveraging into that market

where the exercise of that market power is constrained. So you are doing two things: you are leveraging them one way and you are leveraging into a market where the abuse of market power is constrained by the FRAND network. Why would they do that? Why would you not just take the chipset market where you do not have —— you do not have the problem of constrained by FRAND?

MR NOBLE: Well, the logically coherent answer to that is to say that, absent this behaviour, you potentially have market power in SEP markets, but there is a very strong countervailing force against you, which is called the FRAND regime; the ability of implementors to go and essentially get a regulated price, as it were, from you. So you cannot —— you are not free to exercise that market power, but the logic of the theory of harm is that you unshackle yourself from that regulated price by using the market power in the chipset market and then you, in a sense, disable the FRAND regime so the regulated price is no longer active and you in a sense are unlocking this market power that you had there.

Now, I guess there is a conceptual debate about is the rent that you are taking there actually the rent of chipset market power or is it the as—yet —— the constrained rent that you were not able to take in a SEP regime? I am not sure it matters which version of that

world is true. It is the fact that ——

THE CHAIR: But one way or the other, you are using your chipset market. Whether you describe that as exercising your chipset market power or leveraging your chipset market to unshackle the SEP regime from FRAND, one way or the other it is dependent on your chipset market power so why do such a complicated thing of trying to take your rent out of a constrained market? Why not just take it out of the unconstrained market? It does not make sense to me.

MR NOBLE: Well, the rationale would be that —— and I think Dr Padilla alluded to ——

DR PADILLA: I subscribe to what the Chair has been saying.

THE CHAIR: I am trying to understand what you are saying. I just do not understand.

MR NOBLE: In the chipset market, if one takes the view that there are some entry barriers, the question is: why would someone go to the trouble of overcoming them? They go to the trouble of overcoming them because there is an incentive to overcome them. The higher the chipset price, the stronger the incentive.

So normally in an exploitative abuse case, we explore the question of, well, or, rather, we think very hard about exploitative abuse, because we think, well, the high prices are what killed the market power

in the first place and so a lot of markets that have entry barriers are self—correcting, either people behave themselves and charge low prices, therefore not exploiting their market power, or they charge high prices, take advantage of their market power and encourage entry. This allows Qualcomm to have it both ways. They can charge a lower price. It might still be higher than the competitive price, but it is a lower price than they would have otherwise charged, but they can still take advantage of the fact that there is this sort of excess market power that they have not converted into chipset price, the more contestable market, into a high price that they then charge in the SEP market where it is not contestable because these are patents that in a sense government regulation says that you cannot contest them.

DR PADILLA: If I may, with all due respect, I think that there is a problem in that line of argument and the problem is as follows: suppose that you decide not to exploit your market power, which at points by the way it is characterised as being an indispensable trading partner. Suppose you decide not to exploit that directly but indirectly through the patents. What is going to happen is if you think that entry into chipsets is possible if the price signal is —— if the rents are

sufficient, what you are going to have is that those OEMs that are paying you those very high royalties are going to sponsor the entry. So eventually your attempt to displace your market power from one market to the other is going to end up backfiring in the first market anyway.

MR RIDYARD: Your response to that?

MR NOBLE: I think it really matters about who benefits from the entry because the more atomised the customers, the less incentive that any individual OEM has to, in a sense, go through this process of undermining Qualcomm's market power in chipsets, not to get a lower chipset price, but in order to get a lower royalty rate, which inevitably is going to be shared with everybody because, you know, if they feel comfortable to then go and launch FRAND charges and so on, then it is likely to set a precedent that will undermine Qualcomm's strategy and mean that all OEMs benefit. So there is this big externality. There is lots of cost on them and there is lots of benefit to everybody else and so there is really a question mark about the incentives on the incumbent OEMs in order to sort of do this public good of going to, you know, the trouble of sponsoring entry with the purpose of lowering royalty rates.

DR PADILLA: No, Robin, Mr Noble, I did —— you are not

responding to the mechanism that I postulated. I did not say that because they were paying very high royalties, they would initiate FRAND litigation. What I said is that with the rents that —— in order to save those rents, they would sponsor entry into chipsets. In fact, to some extent, you can think that that is what Apple did.

MR RIDYARD: I was having that very same thought. Does that help you or hinder you?

DR PADILLA: Well, it did that in response to the chipset position of Qualcomm. You do not need to go through this very convoluted situation. If the problem —— if the problem in the market is that you have market power in chipsets, you address that problem directly by trying to sponsor entry and have a more dynamic and competitive market.

THE CHAIR: So I think your response, Dr Padilla, is to Mr Noble's point that the logic of exploiting market power indirectly is that that, he said, allows Qualcomm to have it both ways. It is not exploiting it directly in the market where it might face competitive entry, if it were to do so, by charging excessive prices there. It thinks that it can exploit the market power indirectly and thereby gain the monopoly rent while, to some extent, shielding itself in its position in the

market which gives it that monopoly rent.
Your response is: it would happen in either way?
DR PADILLA: Because the buyers are the same and the buyers are powerful.
THE CHAIR: Because whether or not you have entry in response to exploitation in the chipset market or you have it in response to exploitation in the SEP market, your point is the buyer is the same, ultimately it is the OEM, and the incentive is one and the same?
DR PADILLA: It has an incentive to anticipate those rents and it can do that through entry.
THE CHAIR: Right. So the constraint from the threat of entry is the same whichever market you exploit?
DR PADILLA: Under the assumption that Qualcomm is doing what is alleged to be doing.
THE CHAIR: Yes.
DR PADILLA: Which, you know, it is —— which we are operating here.
THE CHAIR: We are just trying to tease out why economically you would do that. I understand. That is what your response is?
DR PADILLA: Yes.
MR NOBLE: My response to that is this issue around the externality that you create, because if you are a large OEM and you sponsor entry and the purpose of sponsoring

entry is not to lower chipset prices because in a sense they might not be too high, or they might be, but they might not be in this postulation, there is a very direct externality that they create by that because they do it in order to then be able —— because to stop Qualcomm having the rent, what you have to do is to get them to behave differently and one way you might behave differently is that you might launch a FRAND challenge or you might, you know, just drive a very hard bargain in the negotiation that you have, but I think, as Qualcomm have highlighted, some OEMs have MFN clauses and so if you do that, then you benefit both yourself, who incurred all that entry sponsoring cost and energy, but you also benefit your rivals also who did not and therefore they get a lower royalty rate as well and so there is a question mark about the incentives in order to go about doing that in the first place.
MR RIDYARD: But then you are saying there is no point in investing in efforts to reduce your cost if it is going to reduce your rival's costs in the same way?
MR NOBLE: Well, it is not that you do not have any incentive; it is that you have an attenuated incentive. I think that the distinction.
DR PADILLA: But if you invest in providing self—supply, you are not generating any externality. I do not think

that ——
MR RIDYARD: Well, you would if you believe that you invest in self—supply. You can then mount a FRAND challenge because the leverage thing goes away and you get the FRAND rate down for yourself and then the middle automatically comes down for everyone else. That is the argument being made.
DR PADILLA: But you will have eliminated all market power in chipsets and then you will have eliminated —— I mean, then the theory of harm is no longer there.
MR RIDYARD: Okay.
DR PADILLA: I am saying this because in the counterfactual, the counterfactual, as I understand it, now, is that you will go FRAND.
THE CHAIR: We will get on to the counterfactual. Let us park that.
DR PADILLA: It is only one comment there, which is that going FRAND in the counterfactual will also generate externalities so the externalities are not different in the factual and in the counterfactual.
THE CHAIR: We will move on to the counterfactual later, probably tomorrow.
MR RIDYARD: That is very useful. I think we will have to reflect a bit on that exchange, but I think it was a very useful one to have aired so thank you very much.

My next subtopic was buyer power, including self—supply. As I go through my questions I will probably find myself thinking we have already covered that in the preceding discussion, but let me have a go anyway. I guess I can ask just as a sort of conceptual question really: what are the things we should be looking at when we talk about buyer power? What are the —— why is buyer power a mechanism that is different from other competitive —— distinctive from other competitive factors and what it is we should be looking at in principle when we come to evaluate whether buyer powers is effective or not? Maybe, Dr Padilla, you might go first on that one.
DR PADILLA: Yes. I think the reason why buyer power is particularly relevant in this case is that if Apple or Samsung stop purchasing chipsets from Qualcomm, then that has a dramatic impact on the profitability of Qualcomm's chipset business and it does so because they represent a very significant chunk of the volumes that Qualcomm sells. That means —— that is very important because that means that Qualcomm's threat of not supplying if you do not agree on a certain price are not credible and they are not credible because Qualcomm cannot get all those volumes and find alternatives for those volumes.

Now, of course this is possible because Apple and Samsung have dimensions of flexibility, either through self—supply, sometimes, either through MediaTek, in some occasions and it is —— though difficult, it is easier for them to exercise that flexibility than for Qualcomm to find alternatives to Apple and Samsung. That is why I was, before, illustrating or, you know, highlighting the fluctuations in Qualcomm's shares in response to decisions made by Apple and Samsung.

MR RIDYARD: Mr Noble.

MR NOBLE: I think there are two real sources of countervailing buyer power that we need to think about in the context of this case. I think the first one is the topic that Dr Padilla just covered, which is really the size of the buyer in the chipset market. However you define it, whether it is his market or my market, I think there is agreement that it is possible that very large buyers that are active in those markets, if they have a credible alternative, if they have good choice, they can then threaten credibly to the supplier that is potentially dominant to switch away a significant volume to essentially seek to try and discipline their behaviour.

So that is sort of conceptual source one of buyer power.

The second one is actually in the licensing market, in the SEP market, and that is where one might be engaging in a cross—licence and so —— now, I think that is not very relevant for Apple because they did not have any or they do not have very many SEPs. It is also not relevant for several other OEMs because quite a few of them do not have that. So that sort of falls away for a lot of them.

There are a number of them that do have a number of SEPs and so that is an interesting question to ask ourselves: could they use those in order to act as some sort of countervailing force?

MR RIDYARD: Does Qualcomm need SEPs?

MR NOBLE: Well, that is really the question then and there is some debate between Dr Padilla and I in the joint statement about, in a sense, the differing positions of the OEM, which is implementing the SEPs. I think, as I understand the technical and the industry experts, there is universal agreement that a mobile phone implements these. So in order to —— for Apple or Samsung or Huawei to sell a phone that is licensed, it has to have these SEPs. However, Qualcomm does not sell phones. It sells chipsets. So there is a question mark about, well, does it need them or does it merely want them? There is a big difference between needing and

wanting and if it just —— I do not think it needs them because, as far as I can see, it generally is not —— certainly in the world we think in device licensing, it is the way things are. It does not need to have these SEPs. It may want to have them for security. It may want to have them so it can use them as part of a grant—back network but, in a sense, those are nice—to—haves as opposed to must—haves and that is a critical distinction between two sides of the debate. One side, the OEM, needs the patents in order to sell licensed phones and Qualcomm does not necessarily need them.

MR RIDYARD: Any comment on that particular point?

DR PADILLA: Sorry, on the SEPs?

MR RIDYARD: Yes.

DR PADILLA: I think that —— I am not going to get into whether Qualcomm needs them or not, because it is more a factual issue. But in terms of the economics, I think that the evidence that we see is that they have a very limited impact on the agreements that Qualcomm has entered into. They do not explain much. That is why, in the leveraging analysis, I downplay and I only perform a robustness test with respect to cross—licensing. So there I would agree.

But we were talking about chipsets and on chipsets,

on the contrary, I think that Samsung and Apple do have very significant bargaining power by virtue of their sheer size and the availability of options.

MR RIDYARD: Two points —— as you just said: two points there. One is what does —— what do I have to lose if I do not get this customer's demand and the other is: can they credibly threaten to take that away from me? On that credibility point, I mean, how —— can you give us any advice on how we should evaluate that credibility point, because there are quite a lot of points in the case where there is —— obviously there is uncertainty about the technical capability of various players in the industry. We know some are more accomplished than others, but we do not really know how credible is it when Apple says, "If you do not give me this price, I will switch to MediaTek or VIA or whoever". I mean, can you give us any advice about how we should factor in that uncertainty into our analysis? Dr Padilla, start on that.

DR PADILLA: Yes, I think that there is —— the first question is at which point in time we are going to be looking at this and there may be some disagreement there. I think my view is that it has to be at the point in time in which there were negotiations.

MR RIDYARD: I understand your position on that.

DR PADILLA: According to the fear of harm. There what you need to see is what are the available alternatives? Are there available alternatives? Did they have products and did they have the capacity?
MR RIDYARD: But even that is not clear, is it, because if you take the 5G example Apple might have been threatening or Qualcomm might have been concerned that Apple was about to switch to Intel's 5G chips and maybe at some point that was a real fear but, as it turns out now, it appears that Intel made a mess of it and was never able to produce one.
DR PADILLA: That is a very good point.
MR RIDYARD: So how do we evaluate that?
DR PADILLA: We need to focus on the information available to both sides at the point in time in which they were negotiating to understand what were the parties that —— or the alternatives that each of them considered that the other had, because that is what is going to determine the credibility of the threats and the credibility of the bargaining positions.
MR RIDYARD: It is not always easy to piece that together from snippets from email conversations and negotiations.
DR PADILLA: Very complicated.
MR RIDYARD: Mr Noble, can you help us out on that at all?
MR NOBLE: I am not sure there is a magic answer. I mean,

I do think that there is clearly a lot of factual dispute between the parties about what happened when and the relative credibilities of different parties.
I think one answer to that question is one just has to roll one's sleeves up and look in detail at all of that evidence and, you know, I do think that, in a sense, there are two sources of evidence that you have —— two classes of evidence. I think, as you have alluded to, one is the contemporaneous evidence of the emails, the witness statements, what the parties said at the time, and the other is then what actually happened in the market and of course there is a risk with what actually happened in the market is using the benefit of hindsight, but, you know, it does send you a signal about what may have been going through people's minds, how credible really were some of these threats. So, yes, I do not think it is a very easy question to answer, but I think —— ultimately, I think one potentially does have to almost go through year—by—year and make a factual decision about in this year this was credible, in that year it was not.
DR PADILLA: One additional comment because I fundamentally agree with what has been said, but I think that if we use the benefit of hindsight, we need to use the benefit of hindsight 100%. Meaning: you have to think, okay,

what happened one year after, two years after, three years after. What we cannot do, for example, and just as a hypothetical, is to say: we postulate that Apple was able to foresee that Qualcomm was going to be successful, was able to foresee that Intel was not going to be successful, was able to foresee that it would take a lot of time for them to develop their own chipsets, was completely ignorant about the fact that MediaTek was going to grow very fast and it was going to, in 2021, 2022 and 2023 provide an alternative.
Those are, you know, perfectly possible assumptions but not very plausible. I think that if you have foresight, you have foresight for everything or for nothing because otherwise we can tailor —— we can explain whatever basically.
MR RIDYARD: Yes, okay. We will have to wrestle with that problem ourselves.
MR RIDYARD: One other aspect which —— there may be very little in this, but it is just something I thought might be useful to raise with you is of the things that the buyers can do to try and leverage their market power, one suggestion in some of the documents is that it might have been in Samsung's and Apple's interests to link the supply of chipsets with the royalty rates on SEPs in principle. The argument —— I guess the argument there

being on SEPs, you know, they are essential so you have to have them and there is no easy way out of that, but at least on chipsets, even if you might consider Qualcomm to have market power, at least there are alternatives. So could it be rational for big buyers to take steps themselves to link these two products in their negotiations with Qualcomm?
It is almost like the reverse of the leverage theory that we talk about here, but could that be a rational thing for these companies to do or is there some reason why that does not make sense? Maybe, Mr Noble, you might go first.
MR NOBLE: I guess the question is might they have an incentive to do that? I guess the question is do they have the ability to do that is I guess the question, but I perhaps we have dealt with that in a sense that it really is about the size and the credibility of switching. So obviously if you decide they do not have the ability to do it, then incentive slightly falls by the wayside.
If they have —— if they have the ability, do they have the incentive to then engage in this? Potentially, but I think this comes back to the point that I mentioned before about the externality of doing that, because, particularly in the presence of MFNs or if you

do that via a FRAND challenge, then it is not just you that benefits. You are changing the terms of trade for everybody potentially and so, you know, it does not mean there is no incentive but it alters that incentive. It potentially makes that less attractive for you to do it, because normally acting on these kinds of incentives is not free. Launching a FRAND challenge is not a free thing to do. Why would you want to do that?

You might do it if it is really necessary, but if a lot of those gains are going to go to an archrival, well, that might cause you to pause and be less incentivised to do that.

MR RIDYARD: I am thinking —— this logic does not even work, but I am thinking I have no choice but to pay the royalty rate because it is essential, but I do have a choice about how many chips to buy from you so I could go into the negotiation saying, "If you do not give me a good deal on the royalty rates, I will do everything in my power to buy chips elsewhere".

MR NOBLE: Yes, but I think there is a question mark there. If you really have that power, why would you not simply do it more neatly on the chipsets? Because then you sidestep the externality issue.

MR RIDYARD: Okay.

Dr Padilla, is this talking nonsense?

DR PADILLA: No, I think that is actually a very good point and not just theoretical. I think it is practical.

Look, I think that it would be interesting to think in terms of the Apple 2013 agreement there is the BCPA negotiation. There I think that there are different ways in which you can read that negotiation. One possibility, one interpretation, which tends to be the one that Qualcomm favours, is that what Apple did was to basically say, "Look, I think you have to give me a massive amount of money or otherwise I do not buy chipsets from you". By the way, you have to give me that amount of money upfront and I am not going to offer you a volume commitment or a price commitment.

The other interpretation of that agreement is Apple's interpretation, which is that actually what thye secured using that mechanism was a reduction in the royalty. I am not sure exactly what interpretation is correct. I think in the report I have used the Apple interpretation for consistency with the analysis of the theory of harm, but you can see that either directly or indirectly ultimately what they do, by virtue of using their bargaining power, is to reduce their costs quite materially and I do not see any form of externality.

Importantly, I would like to say that implicit in lots of what my colleague has been saying is that

whenever you achieve a reduction in your royalty rate that translates to everybody else on a one—to—one basis, I do not think that the evidence supports that statement. JP3, my third report, I think, illustrates that.

(redacted — confidential information)

MR RIDYARD: Okay. That is helpful.

I want to now move on to the —— well, I have a list of them under the topic of market dynamics. (Pause)

THE CHAIR: I have just been discussing with the panel the timing. We are doing quite well on timing and, sorry, Mr Noble, but I think it would be a good idea if we were able to finish tomorrow. I am sure everyone on that side of the room would be quite happy to be able to talk to you both over the weekend, if that is possible. Rather than just coming back for what may be just the dregs on Monday, I am just wondering if we can make the timetable work for us to finish the hot—tub by tomorrow evening. We do have to clear out of here by shortly after 3.00 tomorrow so I just want to canvas the views of those in the court as to whether we might sit a little bit late today and obviously it has been a long day for you both so if that is not going to be all right, please tell me, but my thought is whether we should sit a little bit late today. So I am thinking

maybe to go through until 3.20, take maybe a ten—minute break to give you a bit more time, then go through until 4.45, 5 o'clock, no later than 5.00, and then to come back a little bit earlier tomorrow, maybe 9.30, so that we can get through the day tomorrow.

That would then bring everything forward in the timetable by a day. So ——

DR PADILLA: I am available.

MR NOBLE: That works.

THE CHAIR: If we do give you a ten—minute break at 20 past, otherwise it will be a long afternoon for you. Can I just check whether that will work for everyone else?

MR JOWELL: It will work for us.

MR WILLIAMS: I think sitting late today is fine. I think there is a question about what is meant by bringing everything in the timetable forward by a day, just because we have a deadline on Monday lunchtime at the moment and so on, but that is probably a question for another moment, Madam.

THE CHAIR: Yes. We can discuss that tomorrow. I was envisaging that everything would come forward potentially so we would finish everything a day earlier than currently. As I have said several times during this and the PTR, if we go short, the idea is that we do not just build in extra days for writing closing

submissions but we bring the timetable forward.

Can I just check if that is all right with the transcriber and the Tribunal staff. (Pause)

MR RIDYARD: Some questions under the general topic of market dynamics which covers quite a few factors to be honest. First of all, I think, Dr Padilla, you have already stated you think it is important when we are looking at market shares and market power assessments, we do it at discrete points in time and you indicated obviously the points in time at which significant negotiations were taking place between Qualcomm and the two OEMs.

Mr Noble, are you in agreement with Dr Padilla on that, because I know at some point you said in some ways you could characterise the situations as at any point one could burst into negotiations if you wanted to?

MR NOBLE: Yes, so I think there is certainly agreement at the moments when Dr Padilla thinks we should analyse it, I agree those are good moments to do an analysis so there is full agreement on that. I think I used the word "continuous" I did not mean sort of every one minute. What I meant by that was the notion that perhaps on a year—by—year basis it is possible that there are negotiations that never happened, that people contemplated and felt dissuaded from engaging in

litigation because, you know, they felt as though it was a pointless exercise, that Qualcomm was in a very strong position and therefore why waste the time and energy doing that. So I do think it is worth doing that.

I think also it is useful to think of that in the broader context, because of course the specific points in time we are talking about here, they relate to —— or, rather the specific points in time that Dr Padilla is referring to are the Apple and Samsung negotiations, but, as I said, there is the indirect mechanism by which other OEMs are negotiating and there are many dates for that and so I think a practical way forward is essentially to do it on a year—by—year basis or something similar to that or perhaps a period—by—period basis.

MR RIDYARD: Just to be clear, even if we were just looking at Apple and Samsung, your view is it would be possible for either party in principle to get in touch and say how about a renegotiation?

MR NOBLE: Yes, exactly. There is a —— there are formal mechanisms that clearly existed that will entitle parties to do that, but I think the —— as I understand the evidence, there are potentially other instances that could have been contemplated where parties might have then engaged in a renegotiation. Even if they were not

contractually entitled to, you know, this appears to be an industry where it is the norm that you do not simply set a rate and then stick with that rate for evermore. You know, there is an updating process that has gone on.

MR RIDYARD: Yes. Is there agreement between you on at which points in time Qualcomm's market power was, you know, at its highest and lowest? Is that something where you may be, Dr Padilla ——

DR PADILLA: Before getting to that, may I respond to what Mr Noble has been saying?

MR RIDYARD: Sure.

DR PADILLA: So I think that my understanding, and I must say that I am just an economist, but my understanding of the negotiation is that there is a meeting of the minds and the two parties decide to renegotiate and there is a difference between renegotiate and unilateral breach. These are long—term contracts, these licensing agreements, and licensing agreements are long—term contracts because they are not renegotiated on a day—by—day basis, month—by—month basis or on a yearly basis and if they are extended, renewed or renegotiated it is because there is a meeting of the minds.

The second point I would like to make is that, again, to be checked by the Tribunal because I may be talking about facts and I am not the best person there,

but my understanding is that Qualcomm's position is that provided that the licensee continues paying, it can renegotiate. It can even challenge and it will not be disrupted in its supply of chipsets. In fact, it appears —— and this is a fact —— that that was the case, even when the licensee, in this case Apple, decided not to pay or instructed its contract manufacturers not to pay.

MR RIDYARD: Is there not some tension there between your two statements because, if that is the case, Apple or Samsung could re—open negotiations on the royalty rate at any point, given that they are assured supply?

DR PADILLA: Well, I think that that means that they are breaching the contract and of course then they can breach the contract and ——

MR RIDYARD: Then there would not be assured supply of chipsets?

DR PADILLA: They would have supply —— sorry, if they renegotiate and continue paying, I do not see any problem there. I think that that would simply mean that there would be a renegotiation or they would be challenging the royalty, but there would be supply and they would have the option to renegotiate or to, you know, revise that royalty without discontinuation of supply. If they breach, and Qualcomm decided not to

enforce, it could have applied the Chipset Supply Practice and not supply. It did not. But I think that my point remains, which is that, first, these are long—term contracts. Second, I believe that they can be challenged and provided that payment is made, in other words, that you continue to be licensed, you are going to be supplied.

So I think that those are important points because that basically means that all those interim situations are just meaningless, are, you know, they do not —— they do not materialise in practice. So the renegotiations happen when the contracts are about to expire and that is my experience in this industry. Not that you have renegotiations on a constant basis, it is that some years before, a year before, a year and a half before the contract is going to expire, the parties enter into a negotiation in order to extend it or modify it.

MR RIDYARD: Mr Noble, do you have any observations?

MR NOBLE: I guess part of this is about contract law, as opposed to economics, about, you know, is it a breach to seek a renegotiation?

MR RIDYARD: Yes. There are limits to what we can get to the bottom of here.

MR NOBLE: Yes, but I think conceptually it is —— assuming

the answer —— it may be that the law gives us a complete answer to that question, but it certainly seems to me that it is the generally accepted approach in this industry that people can approach parties with which they have a contract and seek —— you know, the world has moved on, technology has evolved, the market position of that participant has changed quite significantly. In those kinds of circumstances, the way I understand the behaviour generally, not just of Apple and Samsung, but lots of other OEMs is that there are conversations that happen and there are then either voluntary renegotiations or people potentially maybe they do tear up a contract. I guess it depends on the nature of the contract and the specifics of it, but I think that is why, you know, I do not think a minute—by—minute assessment of market power is necessary, but I do think it useful to have a period—by—period assessment of it to check the logic of the theory of harm to assess whether or not there are significant periods in which Qualcomm is or is not dominant.

THE CHAIR: What periods are you thinking of, if not at the point of negotiations?

MR NOBLE: Well, in a sense, when one is thinking about the other OEMs that aren't Apple and Samsung, you know, there is a whole raft of dates out there of —— and so,

in a sense, you could say, well, even if it just the negotiations, we need to think about other dates when other negotiations happen. So that is going to tick off a lot of the years anyway. There may be other moments when parties could have engaged in a negotiation but chose not to and so that is the logic.

DR PADILLA: The problem that I think we would face in that scenario is, well, first, I do not think that any of us has done that analysis. I do not think that we have looked at all those intermediate points of negotiation, look at the OEM, consider what were the options that it had —— that OEM had in terms of chipsets and understand the scope of the negotiation. So I think that that would have to be done anew.

THE CHAIR: Let us have a ten—minute break now.

(3.17 pm)

(Short Break)

(3.33 pm)

MR RIDYARD: Moving on. I wanted to ask some questions about how we interpret the evidence that we have about Apple and Qualcomm's actual purchases from —— sorry, Apple and Samsung's actual purchases from Qualcomm. If we take the case of Apple first of all, because we have, you know, quite —— a relatively clear picture of sort of buying all of its requirements from Qualcomm and then

almost none and then all of it again. So in —— let me put the easy question: in the periods where Apple buys nothing from Qualcomm, is it obvious that Apple has no market power over Qualcomm in those periods?

MR NOBLE: In the context of the bilateral engagement between the two of them?

MR RIDYARD: Yes.

MR NOBLE: It is certainly a signal that Apple has credible alternatives, if we are thinking in the context of a royalty, the outside options and so on.

MR RIDYARD: It is a pretty good signal, is it not?

MR NOBLE: Yes, it is a pretty good, signal because they felt comfortable to move away. Obviously it is not a perfect signal, because they may have felt that they had to compromise on quality because it is, as I think we were alluding to earlier, an oligopoly where —— so they may have had to trade down.

MR RIDYARD: Could have been costly for them to exercise that option?

MR NOBLE: Yes, precisely. That is a good way of phrasing it.

MR RIDYARD: Then in the period —— I am assuming, Dr Padilla, you do not disagree with that particularly.

In the periods when Apple buys 100% from Qualcomm, I think how do we —— obviously that is consistent with

them being completely dependent on Qualcomm, but it is also consistent with them just deciding to buy from Qualcomm when they could have bought from someone else, just as if I was buying printer paper or something I buy all my requirements from one supplier at any point in time, but there could be six different suppliers I could buy from.

MR NOBLE: Yes, and I think that is why it is important to step back and look at what are those credible alternatives. To take your example, there are periods when in a sense Qualcomm is the only game in town on LTE—CDMA and so Apple buys 100% of its LTE—CDMA requirements from Qualcomm in those time periods, but it is buying significant volumes of LTE—UMTS from Intel in those time periods.

So obviously, as you say, it is consistent with the fact that they do not have very good or very credible alternative options for the amounts that they are buying from Qualcomm, but one needs to look —— in a sense, you go back to the market definition analysis and think, well, what is the product that they are buying, what are the other options available to them in that market, how good a substitute are they, you know, are they having to make quality trade—offs? Obviously if Qualcomm has 100% market share in that market, then they do not have any

alternatives other than not buying that thing, but if Qualcomm has a less than 100% share, then one needs to look carefully at the quality of those alternative options.

MR RIDYARD: You just have to look at the messy facts in those periods and form a view?

MR NOBLE: Yes, I think so.

MR RIDYARD: Dr Padilla.

DR PADILLA: So broadly in agreement, but I think it is important that we consider which decision from Apple and Qualcomm we are focusing on.

So are we looking at the chipset market and the chipset prices that Apple paid at different points in time, or are we looking at Apple's bargaining power when negotiating royalties? There is a fundamental difference in that connection because for the mechanism that Mr Noble has described, this indirect exploitation mechanism, you need to be able to leverage dependency on chipsets in the royalty negotiation.

Now, my opinion, as expressed in my fourth report, is that what Qualcomm could do and the options available to Apple were independent of Qualcomm's share in the market or share with respect to Apple's chipset purchases. The reason is that Apple was licensed all the time through the contract manufacturers and so the

worst case scenario for Apple was to say, "Look, I am not taking the licence, but I am going to still get supply because I have —— I am licensed effectively through the contract manufacturers and the only thing that is going to happen is that for the duration of the dispute, instead of paying a lower royalty, I will be paying a somewhat higher royalty, which imposes a cost, but it is not existential.

MR RIDYARD: Right. I mean, that sort of assumes away the whole case, does it not? You might be right of course, but ——

DR PADILLA: Yes.

MR RIDYARD: —— it is only interesting to have this discussion if we think there is some ability to withhold chipsets as a way of exerting some bargaining power. I am not asking you to accept that proposition, but, I mean, if you were to win that argument, we can ——

DR PADILLA: So if we are thinking of restricting attention to the chipset market, the question is, and, again, we need to look at different points in time, so we could look at, you know, the point of where the market share —— Qualcomm's market share in the market is highest, which is I think at around 2013.

MR RIDYARD: So we are looking at figure 5 of your report?

DR PADILLA: Figure 5 where you have both lines, the blue

and the red.

MR RIDYARD: Opus page 78.

DR PADILLA: Now, that is a fairly transient position, as you can see in terms of market shares, which means that soon after 2013, in fact during that year, Qualcomm starts losing market share. It loses market share fundamentally to MediaTek. Also, you know, fundamentally to MediaTek. Again, I think that this is production, not capacity. If the prices were very high, it would have lost an awful lot more {POE/22/78}.

If we take a view restricted to the chipset market and we focus on the standard notion of dominance, which is the ability to sustain market power for a sustained period of time, that was fairly transient and that is the peak. Everywhere else you have market shares that are high, but not that high and, again, remember this is production, it is not capacity.

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

MR NOBLE: Well, I think this goes back somewhat to the debate about market definition because I think, you know, if you go back to the Class Representative's table and you find tables with very high market shares, 100% some of the time, in LTE—CDMA, and I think —— if I have my dates right, I think quite a lot of what is happening on the red line in Dr Padilla's chart is actually other

players essentially competing in UMTS chipsets and so ——
MR RIDYARD: It is hiding the market leverage in CDMA?
MR NOBLE: Precisely. I do not know if we can get that up? I have forgotten what that reference was.
MR RIDYARD: Which one?
MR NOBLE: This is the Class Representative's two—page note on market shares.
MR WILLIAMS: {X/2.1} I think it is.
MR NOBLE: The last page {X/2.1/4}. No, sorry, the previous page {X/2.1/3}. Yes, this one. So, yes, you have a series of 100%s for Qualcomm up until 2014 and then it is still quite high after that, but it is obviously going down. So it is painting a different picture but in a sense in the UMTS segment there are alternatives. There's a question mark about the credibility of them, but you can tell that because the numbers are not 100% any more, but in CDMA there are not alternatives until 2015 and in a sense then the shares go down.
MR RIDYARD: Yes.
DR PADILLA: If I may, I would like to take you again to figure 3 and figure 4 in my report. We have seen those figures a couple of times and it is helpful.
MR RIDYARD: Can you remind me of the page number?
DR PADILLA: Page 54 and I believe it {POE/22/57}.
MR RIDYARD: Thank you.

DR PADILLA: So I would like to draw your attention if you look, for example, at 2013. You take a vertical line on both graphs in 2013, that will give you a clear picture of the relative insignificance of CDMA for both Apple and Samsung and, again, the mechanism that I was describing before is you have —— somebody is trying to exploit you there, there are not that many volumes, you could be able to exert a disciplinary role by transferring business to UMTS. It is a very, very small volume of CDMA, especially at that point in time. It grows, it keeps fluctuating, but at that point in time, which is the peak that we saw in the aggregated market share, it is very little. So I do not think that —— there may be some hiding, but it is very, very small.
MR RIDYARD: But I can see that argument working when we are —— if we are talking about straightforward market power in the chipset market power to raise prices above a competitive level, but if we are talking about power to exert leverage on the FRAND prices by withholding chipset supply, even if it is only —— make up a number —— 15% of Apple's requirements, 10% of Apple's requirements, it could still —— could it not still be —— if it was a matter of cutting off supplies of those CDMA chipsets, could that still not be extremely important to Apple and extremely costly to Apple to say, "Well, we

can no longer service that part of the market"?
DR PADILLA: As opposed to whatever inflated royalty 100% of its volumes for a very large number of time? It is an empirical question, but I do not think the CR has presented any evidence in that regard.
MR RIDYARD: Mr Noble, do you have any comment on that?
MR NOBLE: I think there is a reference in RN9 where I talk about the absolute numbers that we are talking about here, because we are talking about many millions of handsets, you know, that are at issue that are using the CDMA networks. We are also talking about OEMs, I mean, particularly Apple, its profit margin is around 50% on its —— on its handset business and so if it is selling a handset for $600, $700, $800, then it is earning a lot of money per handset and therefore losing out on a share of sale —— a volume of sales of a figure exactly the numbers, I am just trying to find them, tens of millions of sales per year is going to be very, very valuable —— very impactful for it and so it is the ability to deny access to that market.
I think there is also a brand —— well, if I just might finish. I think there is also a brand effect as well that actually being unable to service a particular type of customer may harm your brand in the longer run as well, although I think the primary mechanism that

I am thinking of here is this is one of that you make a lot of money per handset, you cannot make those handsets any more, you potentially lose those sales.
THE CHAIR: Just before Mr Padilla interjects, is there anywhere where you do any empirical analysis of the extent to which the money that is —— would be theoretically lost on CDMA compares with the gain that you would make in the SEP market even?
MR NOBLE: Perhaps Dr Padilla —— I am just looking for that.
MR WILLIAMS: I think the reference Mr Noble is looking for is paragraph —— I think it is paragraph 4.18 of his ninth report, which is {POE/23/44}. I think that is the reference he wants.
MR NOBLE: Yes, this was the one I was looking for.
THE CHAIR: All right. So that makes the point about the volume of CDMA chipsets. Do you compare that with the gains to be made in the SEP market?
MR NOBLE: I do not present a mathematical answer to the comparison of the two, but, as I have said, Apple is typically making very significant margins on its handsets in the order of hundreds of dollars per handset and so it seems intuitive to me that the kinds of statements that they have made about the cruciality of the CDMA market for them would create a strong incentive for them to be willing to compromise in a royalty

negotiation.
MR RIDYARD: You would agree that the trade—off between those two factors would be what counted here, the loss of profit on the CDMA handsets not sold, against the possible gain to the royalty payments, plus the —— I mean, you did also mention of course the reputational damage that might be suffered?
MR NOBLE: Yes. So I think there is a trade—off to be made there. So I think it does mean that in a sense there is not an unlimited overcharge that you could levy for this, but that is common. I think for me the question is not: could Qualcomm just extract any rent from players, like Apple and Samsung?
MR RIDYARD: Sorry, I was —— in my question I think I moved away from the pricing question and I am now talking about the actual ceasing of supply of chipsets. So we are not —— we are not talking about coping with an increased cost: we are talking about non—availability. I mean, is that not the leverage that is —— that motivates the CR's theory of harm?
MR NOBLE: So, so it is not being able to make these sales and then potentially losing very large amounts of profit.
DR PADILLA: So let us think a little bit about that calculation. So suppose that we only had UMTS and UMTS

was, you know, and Qualcomm was serving 100% of UMTS and there are no authorities and the CMs are not licensed. The contract manufacturers are not licensed so let us put ourselves in that position. A threat to withhold 100% of supply of chipsets would be a very credible threat. It would be a very credible threat because you are losing the margin of that 100% and that is going to be very significant and it is going to allow whoever withdraws that to increase the royalties significantly.

Now, let us suppose that instead of withdrawing 100%, we withdraw 0.1% of the demand of Apple. So let us assume that CDMA exists now and it represents 0.1% of its sales. Withdrawing 0.1% of its sales is not going to achieve much in terms of an overcharge in terms of the royalty because that will be an overcharge that applies to all the volumes. Mostly likely what will happen is that the company will say, "Okay, I do not sell 0.1% of my phones".

There must be a point in between that means that there is credibility or not credibility. Paragraph 4.18 in Mr Noble's ninth expert report talks about absolute figures, 80.5 million units, and that looks like a very large figure. I think it is a large figure.
MR RIDYARD: Please be careful with the numbers.
DR PADILLA: Sorry, excuse me for that, but if we think in

terms of percentages, it is a very small percentage and that is what I indicated by reference to figures 4 and 5. I do not have the numbers on top of my head and maybe I should not even disclose them, but they are very small.
MR NOBLE: I think the point I would make is it is —— one should not simply compare those two numbers because what we talk about when we talk about denial of supply is that millions of handsets potentially do not get sold and that means that potentially —— well, let us just say 1 million handsets. If you are earning $100, you know, that is 100 million of lost profit from that 1 million handsets that you have just lost.

So it might represent, say, 10% or 20% of your sales, but one then needs to consider, well, how does that compare to the size of the royalty overcharge that is being alleged here and I do not know if I am allowed to say how big that is? I am just pausing.
THE CHAIR: I mean, I think the question was not what are the figures, but had you done the empirical analysis and your answer is that you had not done empirical analysis. No, that was all my question was directed at. Thank you.
MR RIDYARD: I think that has been useful, but I think probably we have taken that as far as it is useful to do

here.

Maybe we could switch focus now on to Samsung, where their pattern of purchasing is somewhat different because it is less extreme, is it not, in that it is always buying a reasonable chunk from Qualcomm, but then it does not go to the hundreds or does not go to the zeros either?

Is there anything —— obviously that is partly a function of the much wider product range that they have and just the way they do business, I guess, but is there anything do you think different about what that tells us about Samsung's buyer power compared to Apple or is it just something that just is explained by more mundane facts about how they do business?
MR NOBLE: Some of it may be related to mundane facts about how they do business. I mean, one of the less mundane facts, I think, is that I understand from some of the evidence that they have a strong commitment to multi—sourcing and so in a sense one would expect that they would not give all their volume to one entity. We can observe from Apple's chosen behaviour that they have a desire for it, but it appears not so strong that they are not willing to deviate from that, because they do single—source at times.

So there is a multi—sourcing element to this, but

I think the other point that is worth bearing mind, I think, is because of that wide range of handsets, it may mean that for different groups of the handsets it regards different suppliers as more credible for one tier of its phones and other suppliers as less credible for those tiers of its phones. So for any particular set of group of handsets within that, it may be making different purchasing choices. Then of course what we observe is the total of all of that in the data.
MR RIDYARD: Yes.
DR PADILLA: I tend to agree with that and the only thing that I would add is that, however, we need to be careful when drawing inferences from single—sourcing and multi—sourcing in terms of buyer power. Oftentimes a strategy to increase your buyer power is to multi—source, but that means that the people that single—source, maybe they are very, very confident in their purchasing power and they do not need to multi—source because they are able to, you know, organise competition for the slot, cut—throat competition for the slot, and instruct very significant rebates.
MR RIDYARD: Just looking at the charts, you could interpret either chart in either direction actually. I can see that.

I wanted to ask you about this notion of the unavoidable trading partner. I know it is a sort of term of art in the law, but is it —— in terms of the economics, is that a useful concept and, if so, what does it mean?
DR PADILLA: Personally I think that it is ill —defined, asking excuses towards the lawyers in the audience. It is not clear to me what they mean and they can mean many different things. They can mean it is a product that is an input that you need in order to sell a given product, or it is a product that you do not have, you not only lose the volumes of that product but you lose your entire business.
So I think it is somewhat ill—defined, but in the context of this particular case, what it seems to me that it means is that Qualcomm has such a product, such —— the chipsets of Qualcomm are such that they can bring Apple and Samsung to their knees. If they do not have access to the chipsets, their business is fundamentally affected. It is so significantly affected that they are willing to pay, you know, very high royalties over their entire volumes.
That I think requires not only dominance, it requires an absence of alternatives and an absence of alternatives, even if those alternatives are of lower

quality. That has to be an existential threat, it seems to me.
MR RIDYARD: Mr Noble.
MR NOBLE: I mean, I do not comment on precisely what the law interprets ——
MR RIDYARD: I am not asking that. I am asking whether as an economist, you can give us some helpful guidance on how we should be dealing with this concept.
MR NOBLE: I think when —— if we go back to the market definitions, I think if we observe that Qualcomm has 100% market share in a particular segment, then I think one could characterise that as a signal about them being an unavoidable trading partner, because if you wish to be active in that segment, then you have to trade with them because there are no other suppliers in that segment.
It is also possible that even with less than that share, they might also be an unavoidable trading partner, because I mean this goes back to the role of quality that actually the quality delta between Qualcomm and the other entity or entities in that segment or in that market could be such that it is in a sense unavoidable that you are going to give a significant volume of your sales to Qualcomm and there may be some degree to which you vary that, which is why I think it

is a slightly different question than the question about market definition, because it could be that you discipline them via reducing the share that you give them, but it may be that you are not comfortable taking that share down to zero and, in that sense, it is unavoidable that you are going to give some of your business to that particular entity.
MR RIDYARD: In that scenario, are we saying so then unavoidable trading partner, but it is not giving them —— it is or is not giving them leverage ——
MR NOBLE: It is certainly consistent with them having leverage because then if there is this sort of assured base of demand that you cannot take away from them or it is very costly to take that away from them, then in a sense that gives them a degree of leverage over you in those negotiations, such that they might try and take advantage of that.
MR RIDYARD: Let us explore that. Like I say, it is almost inconceivable that I would buy nothing from this supplier. I have to buy 10% of my requirements from this supplier because it does something that nothing else can do, but I could vary it between that 10% and 80% so I have those 70 percentage points of discretion.
MR NOBLE: Yes.
MR RIDYARD: Is that a situation where I am dependent on

that supplier or does my ability to vary the 70%, is that a big enough stick or carrot, whatever it is ——

MR NOBLE: It is a large stick and so, in a sense, you can discipline them. I mean, I think one might say that there is still a degree to which they can discipline you with the 10% because they know, you know, as long as both parties are aware that that really is the deal, that there is this 10% that you cannot really take away from them, there is a degree to which your stick is not going to be effective or at least there is a counter—stick available to them and so it then becomes really a question of the trade—off between the size of those two sticks.

MR RIDYARD: And therefore the cost of crossing the red line?

MR NOBLE: Exactly. Obviously if one approaches the limit that is an infinitesimally small amount of volume, well, there is not a lot of difference between that and zero, but when it becomes a significant share of your business, then it is a serious question to answer.

MR RIDYARD: Dr Padilla, is that something you agree with?

DR PADILLA: Yes, but I would like to elaborate a little bit. I would like to take it further. So, again, to some extent, and you are going to recognise the author of these two terms, there is a difference between an

essential facility and a convenient facility. The essential facility is essential. If you do not have it, you cannot produce. If you do not have access, if the chipsets of Qualcomm were essential, then Apple and Samsung would surrender in the negotiations, assuming everything else about contract manufacturers, etc.

If what Qualcomm has is convenient, then it is not clear, because one would have to think about what would be the sacrifice of substituting away from Qualcomm to an alternative etc and then one would need to do, and, again, a cost benefit analysis. Such cost benefit analysis is not available to the court. It has not been conducted by the CR and for the reasons that I have stated before, because I think that actually it is irrelevant given the situation with the contract manufacturers, we have not provided it either.

MR RIDYARD: Okay. Thank you. That is helpful.

I just wanted to refer to a couple of specific points in the joint economic statement. This is perhaps just jumping about a bit now within one topic to another within this notion of market dynamics. Per 28.5 ——

MR NOBLE: Which number?

MR RIDYARD: It is paragraph 28.5. Dr Padilla, you make a comment, which I was a bit surprised at, and I just wonder whether you might want to —— you say:

"Because Qualcomm consistently undertakes R&D, that is inconsistent with it having market power effectively."

{POE/24/16}. Is it your view that any firm that undertakes significant R&D does not have market power or is that a product of the word limit that was put on you?

DR PADILLA: So let us see. What is a dominance? Not just market power, dominance? Dominance, ability to act independently of your competitors, consumers, etc. Independent in what dimensions? On the dimensions in which you compete. You compete on prices, but you compete on quality. You compete in development. What is that that you would expect —— what is that you would expect from an idle monopolist? You would expect idleness. If I keep investing massive amounts of money, I am not idle.

MR RIDYARD: What about a ruthless monopolist though?

DR PADILLA: Ruthless in what sense?

MR RIDYARD: In the sense of maximising my profits and making the most of my monopoly position at every point in time.

DR PADILLA: Again, the question is if that ruthless monopolist would exploit its position but would not invest. It would give the money, all those rents, to its shareholders.

MR TURNER: Why does a monopolist not want to secure its dominance for the future?

DR PADILLA: Oh and that is interesting. If it needs to secure its dominance in the future, it is not dominant.

MR TURNER: Well, no company is dominant forever, unless you can give me an example.

DR PADILLA: There are companies that are dominant for very long periods of time ——

MR TURNER: Maybe long periods of time.

DR PADILLA: —— because they have a legal monopoly or because they enjoy a de facto standard.

MR TURNER: Is it not readily understandable that a monopolist might be enjoying its monopoly position, enjoying the excessive profits it is making and wanting to make sure it is going to be in the same position ten years from now?

DR PADILLA: But then it is not a monopolist, because it is defending its position by investing.

MR TURNER: Dominant then. It is certainly dominant.

DR PADILLA: I am going to use an example which I am not particularly fond of but is a common example that has been used, which is Microsoft browsers. I am not particularly fond of it because I defended Microsoft in that case so I think I take it as a loss, but what happened there is you see the period in which Microsoft

was competing with Netscape significant improvements in Internet Explorer, new launches continuously. It acquires a monopoly position and regards that it has —— that monopoly position is protected by network effects. No launches of new versions of Internet Explorer.

What happens as soon as there is entry again by Firefox and Chrome? Again, investments.

All this does not correlate much with the market shares. It correlates with the existence of competitors or not. So even if Firefox and Chrome were relatively small, the competitive pressure that they exerted forced Microsoft to invest and innovate because it had to protect its position, but it had to protect its position so it was no longer dominant.

MR TURNER: Are you saying there are long periods when Microsoft did not invest and innovate?

DR PADILLA: There are long periods where it did not invest in the browser, yes.

THE CHAIR: Are you not conflating the question of dominance and monopoly?

DR PADILLA: I was taking the extreme example for illustration. A dominant company is a company that can act independently of competitors, customers and clients. What I am saying is that acting —— the word "acting" refers to the dimensions of competition. You compete in

prices and you compete in non—prices. In fact, if you do not keep investing in chipsets, your position in the market declines very, very quickly.

MR TURNER: But take the pharmaceutical industry, for example. It is well—established that companies that have a dominant position in a therapeutic area, perhaps because of a patent monopoly, will invest very, very heavily in that technology. They do not sit back and just take the profits. They invest very heavily in that technology and file many, many, many more patents —— there is even a term for it —— to extend the monopoly beyond what they otherwise would have or their dominance, and we can use either, well into the future and at the moment I am having some difficulty with your proposition that as soon as somebody is in a dominant position, they sit back and put their feet up. They might, but ——

DR PADILLA: So a pharmaceutical company for a period of time, due to patent protection, enjoys some market power. In the investment that they make typically —— I mean, and actually those that are not regarded as anticompetitive, which are those extending the patent in an unfair or an abusive way, their investments tend to be about monopolising other markets, about developing the next blockbuster. So they invest in many, many

different product lines in order to continue their business in other activities, but it is not about investment —— continuous investment in the market because if I have developed, say, Ozempic or, you know, that is it. I think that I have that product and I am going to obtain rents on that product.

MR TURNER: That just not right, is it? People develop in delivery systems, they develop improvements, variations on the molecule, they look at different formulations, different doses, different applications for the drug, new indications. I mean, that is not just ——

DR PADILLA: When they do that —— but if they do that, then I would tell you they are competing. They are competing to maintain a position of leadership once the patent —— the patent —— the molecule patent expires.

THE CHAIR: So we have your position on that. Does Mr Noble want to comment?

MR NOBLE: I mean, I think for me —— I mean, I think Dr Padilla's outlining what one might term the dynamic competition school of thought in terms of if you see material levels of R&D, then that may be enough to make you comfortable. I think there is a question mark about whether that is the right way to think about markets in general, but I do not know how relevant that is to this particular case because —— and this is goes back to the

exchanges we had earlier on about where is it that the CR is alleging you take your rent, because the dynamic school of competition makes a lot more sense, and there is a debate about whether it makes sense at all, but it is much more coherent in the world that you take your rent in the product that is —— that has R&D in it, because you create an incentive for other people to do that R&D and it is essentially an R&D rate is what you are engaging in there.

But it does not make as much sense in the context of this case where you have one product, where the Class Representative's case is there is market power, but then you are taking the rent somewhere else, that is not that product.

DR PADILLA: The relevance, if I may, is the following, and this does not require that you agree with my perhaps extreme interpretation before: the relevance is if Qualcomm is investing continuously in R&D, it is because it fears that if it does not do so, it going to lose its position vis—à—vis somebody else. That somebody else may be in the market or maybe an entrant. That is telling you the fact that it is investing this very significant amount of money in terms of R&D of revenue, this is a brutal amount of money and keep coming up continuously with new products is because there are

alternatives. If there were no alternatives, it would not have to do that and that is an indirect indication of the existence, availability and credibility of those alternatives.

MR RIDYARD: You have made your position clear.

This is jumping around, but, Mr Noble, maybe this one is best addressed to you. If we look at the current situation with Apple and 5G chips, and we understand that they have now —— this is beyond the period of the claim and so forth, but just to understand the kind of economics and the dynamics of the industry a bit better, I mean, assuming Apple is now able to produce its own 5G chips, I mean, it is now —— is it fair to assume that it is now no longer dependent on Qualcomm?

MR NOBLE: It is certainly less dependent. I think there is a question mark because, and, again, I am not sure I am fully up to speed on the facts on this. My understanding is that it is a relatively recent development that they have launched a phone with their own self—supply chipset and I think it is true that Qualcomm is still supplying chipsets for some of its phones and my understanding of the media reporting about this is that the —— that Apple's self—supply chipset goes in a sort of lower tier of its phones and it uses the Qualcomm chipsets in the upper tier of its phones.

So it is certainly true that it now —— it demonstrably has a self—supply option. The question is how credible that option is relative to in a sense getting rid of Qualcomm completely.

MR RIDYARD: I would like you to comment about the timing of that too because when it comes to the other side, you make this point about respective market power even though in 2018 it might not have —— it was not buying 5G chips, it was looking forward and I understand that point. Does the same thing apply here, when the boot is on the other foot, where they are looking forward and thinking, well, in six months' time, two years' time, I will have my own supply, therefore I will be freed from dependence on Qualcomm? I mean, at what point did that kick in in the —— does that prospective market power work in the other direction as well?

MR NOBLE: Yes. I mean, I think conceptually it should be symmetric, in that in the logic that if Apple were to feel comfortable that it would no longer be dependent, but I think that then depends on what would happen if it used that feeling, that knowledge, that insight, because if it is the case that, say, today, it is currently self—supplying some chipsets and buying some Qualcomm chipsets, if it felt very assured of the supply of those Qualcomm chipsets, then it might feel comfortable ——

well, if it felt that it was paying a too high royalty, it might launch a FRAND challenge or do something like that. If, however, it was not feeling assured about that, it might hold back until such point as it had essentially moved itself fully away, which is essentially the narrative of what happened in —— when it did launch a FRAND challenge, that it appears to have prepared itself to be —— that all new phones would be on non—Qualcomm chipsets and it then took —— had taken steps to prepare itself that it could guarantee the supply of the old phones as much as it could via the CMs, via supply commitments, and so it has hedged its risk by doing that because obviously it may be that it was 100% assured of receiving all those Qualcomm chips on the legacy handsets, but it has mitigated that risk.

If it was wrong, if it made a wrong judgment call, it turns out for whatever reason Qualcomm did withhold them or partially withheld them, it has something in the market. It has the new handsets that it is selling and so it is not ideal for Apple to then potentially have to withdraw its older handsets, but it has a relatively short product cycle.

So that would certainly mitigate its risk.

So I am not sure it is completely symmetric in that regard, because it really depends on the facts about

could or would Qualcomm actually withhold chipsets. I know there are factual disputes between the Class Representative and Qualcomm about whether that is in fact something that could have or would have happened.

MR RIDYARD: Any comment on that, Dr Padilla?

DR PADILLA: No, other than I am confused. I am confused about his explanation. I do not follow it.

MR RIDYARD: Okay. Well, if you are confused, that is ——

DR PADILLA: I am confused because I think that what I have heard is expectations of the future matter, but it only matters in one direction and not in the other and I do not see exactly how that could be the case. There is a lot of speculation as to how Apple would feel, how Qualcomm would feel, and I am not sure exactly what to make about that in the sense that I cannot tell you, okay, on the basis of these facts, I believe that Qualcomm has the ability to impose terms and conditions or not.

MR RIDYARD: Thank you. That is all I have on this topic, so, again, we will give opportunities for clarification questions before we move on to the next topic.

MR WILLIAMS: I think I have one question, sir.

Mr Noble, you were asked by the President about the —— how the theory of harm works and why Qualcomm would exploit its market power on the —— in the SEP

market, rather than in the chipset market.
MR NOBLE: Yes.
MR WILLIAMS: Part of the discussion was about whether the customer was the same in the chipset market and the licensing market. So can I ask you to clarify what happens in two scenarios. One is that Qualcomm puts up the chipset price and the other is that it puts up the royalty level and can I ask you who pays in those two different scenarios? Who pays the higher chipset price and who pays the royalty?
MR NOBLE: Sorry, can you —— it has been a long day. Can you wind back a bit. What was the original question that I was asked?
MR WILLIAMS: The question was from the President about how —— about the theory of harm and —— sorry, Madam.
THE CHAIR: I do not really think that this is a clarification question. It sounds more like a re—examination question.
MR WILLIAMS: Right. Well, I did not want to cross a line, Madam. I thought there was an issue that arose in the discussion about the customer being the same on both sides. That is all.
THE CHAIR: Is there something that you did not understand from Mr Noble's response?
MR WILLIAMS: No, it is not something I did not understand.

THE CHAIR: All right. Then let us move on. Does anyone else have a question?
MR RIDYARD: In that case, we will move on to the questions about conduct and alleged abuse.
The first topic, which I think will be exceedingly short, but I just wanted to run it past you, is this notion of competition on the merits. Again, it is a legal term, but I think my question would be: I mean, is there anything that economic theory or your economic expertise can contribute to help us to operationalise or understand or utilise that concept?
Dr Padilla, do you want to comment? I will accept an answer of "no" on this.
DR PADILLA: I can actually refer to a paper written recently on that topic. So, first, I think that this is a notion that is used, as far as I understand, in the context of exclusionary abuses and in the context of exclusionary abuses, at least the European Court of Justice in (inaudible) says you need to prove that there is no competition on the merits and then you need to prove that there is consumer harm. When it looks at what is competition on the merits, it uses at least two tests. One is the replicability test. Can it be replied or replicated by somebody without market power and then there are alternatives.

Now, the problem with that notion here is that I think that this is an exploitative abuse and in a market where there is no competition, there is bilateral bargaining between an OEM and the licensor. So I am not sure exactly how to operationalise this in this particular case. It seems to me that here we are not talking about acting in a way that is not competition on the merits; it seems to me that the theory of harm is about leveraging market power to extract rents from a counterparty, but there is no exclusion whatsoever.
MR RIDYARD: Mr Noble.
MR NOBLE: I mean, section 6(b) of my eighth report does talk about departure from the normal competitive process and so I think that is my attempt to try and provide some economic insight on this particular point and I think the crux of it is at 6.12, which is {POE/21/83}, which is the extent to which physical supply of components is a factor that is taken into account in a typical cellular SEP licence negotiation.
That does not appear to be the norm in the industry.
MR RIDYARD: But, I mean, I suppose my query on that really is there is no one else, apart from Qualcomm, who is a serious player in SEPs and chipsets at the same time. So is that just a function of the way Qualcomm happens

to operate or is it something more than that?
MR NOBLE: Well, it may be a function of that, or in a sense it has to be a function of that, because there is not anyone else that could do this and so, in a sense, the uniqueness of it, I am not sure how —— whether that really tells us the answer "yes" or "no".
Certainly what it does mean is if you think the normal competitive process is about the features of the products in that market being the things that determine the outcomes in that market, then introducing something from another market into that market is potentially a departure from the normal competitive process.
DR PADILLA: Two comments there, if I may? So, one, I do not think that that is a competitive process. I think that that is a bargain but, having said so, I think that one would have then to establish that Qualcomm has indeed introduced that link. One would have to prove that there have been threats. One would have to prove that there have been actions of discontinuation.
I think that Mr Noble, correct me if I am wrong, I think what you are saying is that that is not necessary that what —— it is enough for Apple to have the feeling that you could be exposed to that danger for the competitive process to be distorted and, frankly, I do not understand that. I cannot see the logic of that.

MR NOBLE: I think we are going to come on to some of these points when we come on to the bargaining model.
MR RIDYARD: Let us leave that. I think we have probably taken that one as far as it is useful.
The second point was, Dr Padilla, you mentioned exclusionary versus exploitative abuse. I just wanted to clarify, Mr Noble, to what extent is there a story here, in your view, about exclusionary effects in the chipset market arising from Qualcomm's conduct or does that play a part in this story or not? I was not sure how —— what the position of that was in your analysis.
MR NOBLE: The RTL conduct, which is what I think you are referring to, is that right?
MR RIDYARD: Yes, yes, I suppose so.
MR NOBLE: So certainly, as I understand the Class Representative's pleadings, they do not plead that that is a standalone abuse. It is a buttressing behaviour. What I highlight in my report is that there are elements of that that potentially create barriers to entry or expansion in the context of the chipset markets, but I have not sought to try and analyse those as a stand—alone exclusionary abuse.
MR RIDYARD: Is that the case though, because it seems to me that —— I mean, if I was in —— if I was —— if I was in the chipset business, it would be nice if I could sell

my chipsets to an OEM who did not have to pay any royalties because it would have lower costs and it would therefore be —— give me more demand for my product, but that is the wrong kind of asymmetry, is it not? That is creating a distortion of competition if one OEM does not pay royalties while everyone else does.
MR NOBLE: Yes.
MR RIDYARD: So the RTL policy or Qualcomm's policies on licensing are really —— are they not designed simply to make sure everyone, like or not like the royalties, but everyone pays them and that is more or less what are designed for, or is that an unfair characterisation of where they are?
MR NOBLE: Well, I mean, it is worth turning up {POE/21/49}. That is in my eighth report. So, I mean, this is where I explain three reasons why I consider that Qualcomm's RTL policy is likely to have acted as a barrier to entry in the chipset markets. So I do not know if —— I will just go through each of the three. Is that useful?
MR RIDYARD: Briefly, yes, please.
MR NOBLE: Yes. So the first one is about the RTL policy creating an uncertain legal and commercial trading environment for chipset suppliers, because it is important to bear in mind what the Class Representative calls "RTL" It is not same thing as end—device

licensing. It is also the other ancillary activities that go around that, such as the non—assert agreements and the clauses that are contained within them. So if we look at footnote 141, we see some evidence here from —— I do not know —— I do not think this is confidential.
THE CHAIR: 141? It is not highlighted.
MR NOBLE: So it is Andrew Hong at Samsung indicating that the failure to obtain a licence from Qualcomm was one of the reasons why Project Dragonfly, which was a joint venture to develop and sell chipsets, did not proceed. Now, no doubt there will be other reasons why that did not proceed, but it is certainly consistent with the position that the RTL policy does create some degree of uncertainty for rival chipset makers.
Then the second reason is about in a sense restricting access to supply or, sorry, restricting access to the market. If we look at footnote 142, and I think this is confidential, that if you read the last line of that, it does talk about something that is consistent with that approach. (Pause)
MR RIDYARD: Yes, but it is also consistent with an approach that is trying to remove free riding from the industry, is it not? It is very hard to disentangle to get to the bottom of some of these.

MR NOBLE: Yes. I do not say that it is completely one—sided. I mean, I think what I am highlighting here is that the RTL policy does have the potential to create these kinds of barriers.
MR TURNER: You refer to the RTL policy as a buttress which is something I have heard and read on a number of occasions. The refusal to license, if that is an appropriate term, not licensing chip manufacturers, might equally be said to just be a state of affairs or the landscape under which you then have to go on and analyse other matters.
MR NOBLE: Yes.
MR TURNER: The term "buttress" suggests that there is abusive behaviour going on but it is not effective enough so I now need to do something to make it even more effective. I just understand what you mean by "buttress" and why you are using that term? Do you mean nothing more than the state of affairs?
MR NOBLE: Well, I do not know. I am a big fan of medieval architecture so I have an image of a flying buttress, but the way I use the term "buttress" is in a sense that there is something that Qualcomm has created which is the —— on the theory of harm, which is it has a too high royalty rate for a chipset —— sorry, for SEPs and the theory of harm is it gets there directly via leveraging

people that need those chipsets and it gets it indirectly via setting benchmarks that are then used by the industry and by courts, etc.

The whole edifice could come crashing down if it were required to licence chipset manufacturers because they do not need chipsets, they make chipsets, and so, in that sense, it acts as a buttress. It is —— because the way I think of chipset manufacturers is almost this —— they are agents that act on the behalf of OEMs to go and get them a good rate, because these guys are immunised from having their supply cut off because they do not want to buy chipsets.

MR TURNER: If you were determined to be abusive, why cannot you just charge —— I mean, I just have enormous difficulty understanding what the factual situation is that you are envisaging when, okay, you decide to license the chip manufacturers. So the same thing start arising as you can pretty much charge any price you want, subject to your FRAND obligations. You are then going to —— let us assume, you are dominant in chips and you are going to the manufacturer and saying okay —— you tell me where your analysis goes from there.

So who is making the FRAND challenge and how —— what possibilities are there for stopping that FRAND challenge if you are the dominant chip supplier?

MR NOBLE: So, in that situation, if what has happened is that there is two —— so I think in your example you are saying that a MediaTek, for example, has gone and sought a licence from Qualcomm. Is that what you are envisaging?

MR TURNER: Well, no, I really want to know what you are envisaging. As I understand it, the term "buttress" has come from you; is that right?

MR NOBLE: Yes.

MR TURNER: So you say that the abusive conduct —— sorry, I hope I am not paraphrasing you unfairly —— but the abusive conduct would not be effective if there was not this refusal to license policy. It is part of —— it is a necessary ingredient.

MR NOBLE: Well, I do not know if it is necessary. I think that is the critical point. That is all also true of these medieval flying buttresses.

MR TURNER: That will not help me.

MR NOBLE: No, but in a sense what you need to be true is you cannot bypass. That is the buttress, it is the non—bypass. There are two ways to buttress the theory of the NLNC behaviour. Method 1 is that actually Qualcomm should have licensed all—comers, including chipset makers. If that is true, then the RTL policy is a buttress because it needs to stop those people being

able to undermine its ability to use chipset leverage over OEMs, because it cannot use chipset leverage over chipset manufacturers. So, you know, if the —— if the world should have involved the licensing chipset manufacturers, then it needs to not do that.

If, however, the world is one where end—device licensing is just the way of the world anyway, then in a sense the buttress is already there. You do not need to worry about the end—device licensing aspects of RTL and the only aspect that is left of RTL, which is where RTL is different from end—device licensing, is the fact that Qualcomm appears to have used or at least the evidence appears to signal that they got commitments from some of the chipset manufacturers not to sell chipsets to unlicensed OEMs and so that potentially gives it control over more than just its own chipsets, potentially gives it control over, you know, potentially 100% of the chipsets.

MR RIDYARD: Is that just not a commitment not to engage in piracy?

MR NOBLE: Well, I do not know if it is a commitment by the chipset manufacturer not to engage in that because if they are not entitled to a licence, then what are they —— what rule are they breaching?

MR TURNER: But you still have a lot of the same problems,

do you not? You can charge a very high price for your chips —— royalty on your chips and you can still exert pressure on the OEMs by refusing to supply and then one gets into just another very complicated situation.

MR NOBLE: Well, I think the —— let us imagine a world in which we have end—device licensing. In a sense, a lot of the RTL aspects cease being relevant because in a sense those chipset manufacturers cannot act as that bypass route anyway. I think that is perhaps one simpler way to think of it, that this is a more direct route to OEMs.

MR TURNER: But the chip manufacturer could make a FRAND challenge and then Qualcomm could say to the manufacturer, "If you are using chips which are subject to a FRAND —— which are —— if your alternative supply is now engaging in —— seeking a FRAND determination by arbitration or by litigation, if you are in that game with these people, we are not going to supply you with chips" and you are back in exactly the same situation again.

MR NOBLE: Well, but potentially not for very long, because in a sense the chipset manufacturer could sweat it out essentially through a FRAND challenge. That is the logic is that —— because they are not selling handsets and they are not reliant on Qualcomm for any particular

input and so unlike ——
MR TURNER: Apple is going to stop buying their chips. Apple say, "We are not going to buy your chips because Qualcomm is going to cut off its supply to us and so we can only make 30% of our phones. So, I am sorry, guys, we will just have to go with Apple".
MR NOBLE: That would work if that particular OEM were buying chipsets from that particular chipset manufacturer, but, if they are not, then Qualcomm loses that leverage.

So the basic idea of the economic idea of RTL is that there is a set of incentives —— or a set of behaviours that Qualcomm could engage in via NLNC and the logic of analysing dominance, etc, is to evaluate whether or not it really does have that market power, because if it does not have that market power, we can all go home. If it does that have market power, we need to think: well, did it actually do that? That is a factual question about whether it actually engaged in those kinds of behaviours.

The logic of the RTL part is to imagine a world in which the chipset manufacturers almost —— they fundamentally undermine the logic of —— sorry, of NLNC and they do that by saying, "We do not care whether you cut off chipset supply because we are going to sweat it

out. We do not make phones. We do not need your chipsets in order to survive", whereas OEMs do, and therefore we will —— we then challenge your royalty rate, we get a really low royalty rate and then we can sell chipsets to OEMs at much lower prices, because the way you are selling those chipsets is a chipset price and a high royalty. They sell a chipset price at a low royalty. That is the basic logic of the core of the RTL aspect.
MR TURNER: You mention the theory of RTL. You are not suggesting that the —— there are other explanations for the RTL, one we are being told about is there are exhaustion issues. You are not saying anything —— you're not disagreeing with any of that?
MR NOBLE: No, I am not. I mean, in fact, at some level it makes the analysis a lot simpler. In a sense, if Qualcomm is right, those are good reasons, then in a sense this bypass route does not exist anyway, because the chipset manufacturers were not entitled to come and make a FRAND challenge and, therefore, in a sense, this bypass route may as well not exist.

The only part of —— you then end up with this sort of other bit of RTL which is this —— the non—assert part, the extent to which one might think that Qualcomm used a threat of litigation against the chipset makers

as a disciplining mechanism to get them to almost act as their deputies in the market and I forget exactly the reference, but there is —— I do not know if it is confidential. There is a deposition from a chipset manufacturer that says something along —— in fact there is an email, I think it is, where a chipset manufacturer writes to Qualcomm and says, "We are very sorry, we have realised that we have breached our commitment to you because we have sold chipsets to an unlicensed OEM. We wish to apologise for that and we have immediately cut off supply and we are not supplying them any more"

So I take that as a signal that, in a sense, these particular chipset manufacturers did appear, at least on some occasions, to respect the restrictions that were in those kinds of agreements.

Now, if that is true, if they do do that, then in a sense it gives Qualcomm some degree of control over more than its own sales of chipsets in the market and then it is very hard to work out what that share is because it is not very clear to me exactly when these agreements applied and when they ceased to apply. The MediaTek example is one. I think it is talked about quite extensively in my report and also it is mentioned, I think, in Qualcomm's skeleton.
MR TURNER: Dr Padilla, do you have any comment on that

exchange?
DR PADILLA: No, I would like to recall that the initial question: are there exclusionary effects on the chipset market for Qualcomm conduct? I think that there is no evidence of exclusionary effect.

With respect to the line of questioning that was followed now, I think that the thing that I would say is that if I was a chipset —— a competing chipset manufacturer, I would be very scared if I was the one to take the licences, because that would be used to put me at a competitive disadvantage and if I was Qualcomm, I would also be very scared because it may actually expose me to exhaustion and I think that it is no surprise that is why we end up with a level licensing.
MR RIDYARD: One question I just had, Mr Noble, when you were talking there, I was wondering whether what you were talking about there was removing the link between the theory of harm and Qualcomm's market power as chipset supplier, because if it is able to exert this power over market, both through its own chipset supply but also through its rival chipset makers way of supplying, I mean, it still might be an unattractive practice, but it is not any more related to market power and chipsets per se, is it?
MR NOBLE: Well, I think if that was all —— I think doing

that on its own, I think, it is not necessarily problematic. I think that is why RTL is articulated as a buttressing practice, because if what you do have is you have a very large market share and you are, you know, a very important counterparty for lots of OEMs, then that gives you a lot of power and then you are potentially increasing that power by adding on these extra elements to it.

Ultimately it is a factual question about whether they did in fact do that and the control that they actually had over those chipset supplies, but I suspect that will be a topic we will come back to tomorrow when we talk about the leveraging analysis, because that affects the measure of dependence.

MR RIDYARD: That may be a good time to break. Tomorrow we will start with the notion of the non—infringing counterfactual and a few questions on that topic.

THE CHAIR: All right. Thank you.

So we will call it a day then. We will come back tomorrow at, if that is still all right with everyone, 9.30. Then we will aim to finish by tomorrow evening. That means then the cross—examination of both Mr Noble and Dr Padilla will be on Monday, 20th.

Mr Moser, you are rising. You want to make some submissions on anything?

MR MOSER: Not particularly.

THE CHAIR: No, okay.

MR MOSER: I just thought I would rise out of politeness.

Housekeeping

MR SAUNDERS: Can I just mention one piece of housekeeping? This is agreed, but it is a variation to an order that the Tribunal made. We have agreed that the cross—examination lists of documents for Dr Padilla and Mr Noble can be exchanged tomorrow, rather than, I think it was —— well, they were due today but they would have in fact been due yesterday, now that everything has been shuffled up. So just to mention that.

THE CHAIR: Okay.

Regarding the timetable after that, I detected some consternation about the idea of filing submissions on —— closing submissions next Friday. I anticipate that you —— or at least those on one side of the room, I detected the consternation. I anticipated that the Class Representative might be wanting to stick with Monday. Is that the case? I see nods behind you, Mr Moser.

MR MOSER: I will defer to Mr Williams who has had that discussion with our solicitors.

THE CHAIR: Mr Williams.

MR WILLIAMS: I think we would find it —— I think we would

prefer to do that, Madam, because, as you know, before the submission comes in, there is a certain amount of document finalisation to do and if the deadline is on a Sunday lunchtime, then all of that will need to be done ——

THE CHAIR: Oh, no, I was not thinking of Sunday lunchtime, obviously. I had been —— no, when I said a day earlier, I was thinking of close of business on Friday.

MR WILLIAMS: Well, that would really compress it by several days, I think.

THE CHAIR: All right. What about, in that case, if we do finish —— well, we will finish the evidence then on Monday evening. On that basis, what about bringing the timetable forward just to the start of the day on Monday because then that gives us all a bit more time? It gives you the weekend. Everyone will still have more than what would have been under the original timetable to prepare written closing submissions. If we said, for example, 9 o'clock on Monday, 27th, is there any problem with that?

MR WILLIAMS: I think that is preferable, Madam.

THE CHAIR: Right. So then, on that basis, we would stick with the remainder of the timetable. That will just build in a bit more time to read the closing submissions and then we would —— then we maintain the Friday start

date for the oral closings. Yes, I think that is what we thought.

Provisionally, on that basis, then filing written closings by 9 o'clock on Monday, 27th.

We will see you all tomorrow morning at 9.30. Thank you very much to both of you.

(4.47 pm)

(The court adjourned until 9.30 am on Thursday, 15 October 2025)

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