



Neutral Citation Number: [2023] EWCA Civ 34

Case No: CA-2021-003431

**IN THE COURT OF APPEAL (CIVIL DIVISION)**  
**ON APPEAL FROM THE HIGH COURT OF JUSTICE**  
**BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES**  
**INTELLECTUAL PROPERTY LIST**  
**PATENTS COURT**  
**HHJ Hacon (sitting as a High Court Judge)**  
**Case no. HP-2019-000032**

Royal Courts of Justice  
Strand, London, WC2A 2LL

Date: 19/01/2023

**Before :**

**LORD JUSTICE BIRSS**  
**LORD JUSTICE WARBY**  
and  
**LADY JUSTICE FALK**

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**Between :**

**InterDigital Technology Corporation & Ors**

**Claimants/  
Respondents**

**- and -**

**Lenovo Group Ltd & Ors**

**Defendants/  
Appellants**

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**Thomas Hinchliffe KC and Jeremy Heald , (instructed by Kirkland & Ellis International  
LLP) for the Appellants**  
**Douglas Campbell KC and Joe Delaney (instructed by Gowling WLG) for the Respondents**

Hearing dates: 14 & 15 December 2022  
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## **Approved Judgment**

This judgment was handed down remotely at 10.30am on [date] by circulation to the parties  
or their representatives by e-mail and by release to the National Archives  
(see eg <https://www.bailii.org/ew/cases/EWCA/Civ/2022/1169.html>).

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**Lord Justice Birss :**

1. This appeal relates to patent EP (UK) 2 485 558 entitled “Method and apparatus for providing and utilizing a non-contention-based channel in a wireless communications system” and claiming priority from January 2006. The patent belongs to the respondents (“InterDigital”), who contend it is essential to the 4G/LTE standard. The patent forms part of a portfolio of InterDigital patents said to be essential to various telecoms standards (so called Standard Essential Patents or SEPs). In the proceedings InterDigital contend that the appellants (“Lenovo”) infringe the patents and ought to take a FRAND licence under the portfolio. The overall dispute was managed into a series of technical trials dealing with individual patents and a separate FRAND trial to identify the licence terms. The validity and essentiality of this patent was addressed in the judgment of HHJ Hacon sitting as a judge of the Patents Court dated 29 July 2021 ([2021] EWHC 2152 (Pat)) following a trial in March 2021. The trial was the first technical trial.
2. Lenovo argued that the patent was invalid on grounds of lack of novelty, obviousness, insufficiency and (in relation to a proposed claim amendment) added matter. Two items of prior art were relied on, a PCT Application published as WO 2004/016007 (“Laroia”) and a technical working document written by engineers from Samsung which was submitted in the standardisation process. It is T-Doc no. R2-052409 (“Samsung”). Laroia was relied on for lack of novelty and obviousness and Samsung for obviousness alone. InterDigital denied invalidity and argued that the patent was essential to the standard. The judge decided that the patent was essential and rejected all the various challenges to validity. The amendment would have added matter, but was not necessary. The only case pursued on appeal is obviousness over Samsung.
3. Permission to appeal was given by Arnold LJ, who remarked in doing so that although he was satisfied Lenovo’s grounds had a real as opposed to fanciful prospect of success, nevertheless they faced an uphill task on this appeal.
4. The only (now) relevant claim of the patent is claim 1. Broken down into suitable integers, it is as follows:

[1A] A method implemented by a wireless transmit/receive unit, WTRU (120), the method comprising the steps of

[1B] receiving a first allocation from an evolved Node B, eNB (110), wherein the first allocation is an allocation of a non-contention based NCB uplink control channel,

[1C] the first allocation comprises a configuration for transmitting scheduling requests over the NCB uplink control channel, and the configuration indicates a periodicity allocated to the WTRU for transmitting scheduling requests on the NCB uplink control channel and indicates which sub-carrier resource of the NCB uplink control channel are to be used by the WTRU for transmitting the scheduling requests;

[1D] transmitting (710) a scheduling request over the NCB uplink control channel in accordance with the first allocation, wherein the transmitted scheduling request comprises a transmission burst, and presence of the

transmission burst on NCB uplink channel resources assigned to the WTRU by the first allocation is indicative of a request for uplink transmission resources by the WTRU;

[1E] monitoring (710) a downlink control channel;

[1F] detecting (720) that a transmission on the downlink control channel is intended for the WTRU based on a WTRU identifier indicated in the transmission on the downlink control channel, wherein the transmission on the downlink control channel comprises a second allocation, the second allocation being an allocation of an uplink shared channel; and

[1G] transmitting (730) data over the uplink shared channel in accordance with the second allocation.

5. In the jargon of the claim, the term “*wireless transmit/receive unit WTRU*” can be understood simply as a reference to a mobile telephone or, in the parlance of some telecoms standards, a “UE” (user equipment). A “*Node B*” is the base station in the cell, and the word “*evolved*” tells the skilled reader that this claim is referring to the 4G/LTE system. At the relevant time the telecoms standard which was in practical use was 3G/UMTS, while the focus of the standardisation effort was on devising the next generation standard: 4G/LTE.
6. A “*scheduling request*” is a request by the mobile for resources on which to transmit data on the uplink to the base station. The terms “uplink” and “downlink” refer respectively to the transmissions from mobile to base station and vice versa.
7. A “*non-contention based NCB uplink control channel*” is a channel used by the mobile to send control signals (rather than user data) to the base station. Such control channels can be contention based or non-contention based. With a contention based channel, each mobile in the cell can transmit a signal to the base station using the same resource as the other mobiles. (The resource can be time, frequency and/or code.) Thus two mobiles may clash with each other, and as a result the signal from one (or both) may not be received by the base station. When a clash happens the solution is for the mobile(s) to wait for a random period of time and then try and transmit again. Since the period is random, hopefully the two will not clash a second time. With a non-contention based channel each mobile has a dedicated resource allocated to it on which it can send a control message to the base station, thereby avoiding a clash. The non-contention based arrangement is all very well in the sense that it avoids clashes and therefore can be a faster way of getting a message to the base station from the mobile’s point of view, but it is resource intensive.
8. The claim is to a method in which both the mobile and the base station play a part. The base station controls the resources on the air link, which the mobile needs to use to transmit data. Feature 1B is the first step, whereby the mobile receives information from the base station which tells the mobile what resources it has been allocated on the NCB uplink control channel. Feature 1C provides more detail about this, explaining (i) that resources on the NCB uplink control channel are to be used by the mobile for making scheduling requests and (ii) that the allocation tells the mobile what time slots (a “*periodicity*”) and what radio frequency(ies) (which “*sub-carrier*”) it can use to transmit the requests.

9. The second step is feature 1D. The premise is that the mobile wishes to transmit data on the uplink and so needs to ask for resources on which to do so. It makes a scheduling request “*in accordance with the first allocation*”, in other words by transmitting using the time slot(s) and radio frequency(ies) allocated to it. The request “*comprises a transmission burst*” and the “*presence*” of that transmission burst on the NCB uplink control channel “*is indicative of a request for uplink transmission resources*”. Thus it is the presence of the signal itself which indicates that a request is being made. As the judge held (paragraph 100), further information may be contained within the burst, such as the amount of data to be sent and the priority requirement, but that is optional (patent paragraph [0037]). As the judge also held in paragraph 100, it is not enough if the base station *could* interpret the presence of the burst as being indicative of a scheduling request, the claim requires that the base station actually does interpret the burst in that way. For reasons which come later, this is an important point.
10. Feature 1E is the next step. It provides that the mobile monitors a channel on which control signals may be sent from the base station to the mobile (a downlink control channel). Then at feature 1F, the mobile detects that a message on the downlink control channel is directed to it, because the message contains a “*WTRU identifier*”. This message gives a mobile a second allocation of resources. This time the resources are on an “*uplink shared channel*”, in other words a channel on which resources are shared out by the base station between different mobiles to allow them to transmit user data on the uplink to the base station. The final feature 1G involves the mobile actually sending the data on the uplink shared channel.
11. The relevant prior art on this appeal is the Samsung document. It was part of the working papers for a meeting of a working group dealing with part of the effort to create what became the 4G/LTE standard. This was the 10-14 October 2005 meeting of 3GPP TSG RAN Working Group 2. It is not in dispute that the document was published before the meeting and forms part of the state of the art.
12. Before going further one item of common general knowledge is notable. In these systems the normal way information of any kind is conveyed from transmitter to receiver is by encoding all the information digitally into a stream of bits at the transmitter, modulating the radio carrier wave accordingly, and then demodulating and decoding that bit stream at the receiver. There is and was a wide variety of ways of doing that. The technique in feature 1D, of using the presence of a transmission burst as indicative of information (in this case a scheduling request), is a different approach. It is an old and basic technique, taught to engineers at university, which can be called “on-off keying” (OOK). There was a debate about the proper scope of the term OOK but the only relevance of that debate on this appeal is to understand the structure of the judgment, which I will come back to. The judge held at paragraph 71 as follows:

“71. I find that OOK was known to the skilled person at the priority date, a basic technique taught at university. Its utility depended on issues of noise, cost and energy consumption. OOK would have been viewed as having no application as a means of transmitting data and was very seldom used in transmitting control information. The skilled person at the priority date would not have been aware of any use of OOK in a cellular network implemented up to that date.”

13. The last sentence of that conclusion is challenged on appeal. The challenge is best addressed in context below.
14. Turning to Samsung itself, the judge accurately summarised what that document discloses at paragraphs 124-127 of the judgment. Essentially Samsung contains a proposal about how a mobile will ask the base station for uplink resources. The key proposal (option (b) of paragraph 3.2 of the Samsung document) is as follows:

“Sending an ‘E-DCH SI-like’ msg on a non-contention resource which is provided periodically (i.e. use a ‘NC-SI’ channel)”

15. In the document “SI” stands for Scheduling Information. The document suggests using a non-contention based channel for scheduling information to be sent from the mobile to the base station; that is what “NC-SI” refers to. The resource on that NC-SI channel is provided periodically to the mobile. And the way the mobile asks the base station for uplink resources on which to send data is by sending “*an ‘E-DCH SI-like’*” message. Although it was not spelled out in Samsung, it would be understood that the message being referred to for comparison was one used in the existing 3G/UMTS system as part of an analogous process in a scheme called HSUPA.
16. HSUPA (or High Speed Uplink Packet Access) was a proposed enhancement to the 3G/UMTS system to allow mobiles to transmit data on the uplink at high data rates. It had a counterpart called HSDPA (High Speed Downlink Packet Access) which had been implemented earlier.
17. It was common ground that the skilled person reading Samsung would recognise the message referred to as “*an ‘E-DCH SI-like-msg’*” as a reference to scheduling information sent by the mobile in HSUPA. As the judge explained:

“129. The message sent in Samsung is an “E-DCH SI-like” message. This is not a term of art. In his first report Dr Moss said:

‘[233] The Skilled Person would have recognised that an ‘E-DCH’ was an uplink transport channel (the ‘Enhanced Dedicated Transport Channel’) in HSUPA. They would also understand that ‘SI’ stood for Scheduling Information. They would therefore probably assume that the authors of Samsung had in mind that an ‘E-DCH SI’ message was a Scheduling Information message sent on a transport channel that was specified in an HSUPA standard, although there is no actual cross-reference to any standards within Samsung.’

130. Prof Valenti’s view was similar. An E-DCH message in the context of HSUPA was an 18-bit message sent at the MAC layer. The happy bit sent on the E-DPCCH was a means of sending a scheduling request. Prof Valenti accepted in cross-examination that the E-DCH message was not conveyed by detecting the presence of the signal, but by decoding the contents of the signal.”

(Dr Moss and Professor Valenti were the expert witnesses for InterDigital and Lenovo respectively.)

18. Earlier in the judgment the judge accurately explained the concept of layers, the difference between physical, logical and transport channels and the significance of the Medium Access Control or MAC layer at paragraphs 22-27. For present purposes the key point is that since the E-DCH SI message, in the context of HSUPA, is a message sent in the MAC layer, it was decoded in order to be understood.
19. The 18 bits of the E-DCH SI message were used to tell the base station about the priority level of the highest priority data which the mobile wished to transmit, how full the mobile's data buffer was (i.e. how much data it wished to transmit), and how close the mobile was to its maximum transmit power.
20. The "happy bit" referred to in the quoted passage above was another feature of HSUPA. The judge explained this at paragraph 54. It is a simple message consisting of a 1-bit signal which either indicates that the UE would benefit from a higher power allowance, i.e. the UE is unhappy, or that it would not: the UE is happy with the power allowance as it is. In effect, in that system, the power allowance represents the resource the mobile needs to transmit data. The happy bit is sent as one bit out of a 10-bit control signal decoded from a channel called the E-DPCCH (i.e. a different channel from the E-DCH).
21. Considering the obviousness case, one can start from a proposition that the parties accepted, bearing in mind option (b). This is that Samsung discloses or renders obvious a scheme as follows. The mobile is given a first allocation on an NCB uplink control channel for transmitting scheduling requests. The mobile could use that to send a message (of some sort) to the base station. The mobile can then monitor a downlink control channel and, assuming the base station grants resources to the mobile having understood the scheduling request, the mobile will detect an appropriate transmission from the base station on that downlink channel and then transmit data over the uplink shared channel using the appropriate second resource allocation. Importantly this description of the scheme satisfies all the elements of the claim save for feature 1D. The question therefore is whether any inventive step would be involved in implementing or developing this scheme in such a way that feature 1D was satisfied.
22. The judge identified the relevant difference between the Samsung prior art and the patent claim at paragraph 128. As he put it, the issue of inventive step over Samsung was whether it was obvious to implement option (b) so that the presence of the message on the NCB channel was of itself indicative of a request for uplink transmission resources. The judge also recognised that there were other differences between the claim and what was disclosed in the Samsung prior art document, but those other differences amounted to obvious variations and were irrelevant.
23. Lenovo's obviousness case over Samsung was put in two ways below and here. Shorn of irrelevant detail and simply put, Lenovo's primary case was that it was obvious to implement option (b) by making the E-DCH SI-like message a 1-bit transmission burst the presence of which communicated a scheduling request (judgment paragraph 131). Although as described this sounds like a single step from Samsung, the primary case really involves two choices or steps. One is to move away from the 18 bits of the known E-DCH SI message down to a single bit which simply communicates that a scheduling request is being made. The other is to change the way the message communicates

information, from a method in which the digital data encoded in the message is decoded in order to understand what the message is conveying (which is how the 18 bit E-DCH SI message communicated information in HSUPA), into an OOK approach which communicates information simply by the presence (or absence) of the transmission burst itself.

24. The point is that the presence or absence of a transmission burst can only convey a single bit of information. So one can see forensically why starting from 18 bits is unpromising if the purpose of the exercise is to demonstrate that feature 1D was obvious. It may seem easier to construct an argument that someone who only wanted to convey a single bit of information might think of using OOK to do it, as compared to someone wanting to convey 18 bits worth of information.
25. The judge examined this case in detail. He examined the expert evidence from both sides with care at paragraphs 141-158. One aspect of this is criticised by Lenovo which I will address below. The judge also examined certain secondary evidence (four other broadly contemporaneous T-docs) which Lenovo relied on in support of obviousness at paragraphs 159-164. He rejected them as irrelevant and there is not now any appeal from that finding. The judge's conclusions on the primary case were set out at paragraphs 165-171. I will return to some of the detail below but at this stage what is relevant is that the judge rejected both steps in the argument. He did not accept that the skilled person would be motivated to move from 18 bits to a single bit, and he also rejected the submission that OOK was obvious to use at all, because the argument that it was obvious was tainted with hindsight.
26. Lenovo challenge this conclusion on various grounds including that it contains an error of principle. InterDigital support the judge's conclusion, deny any error of principle exists, and also has a respondent's notice, which I will deal with below if necessary.
27. Lenovo's secondary case sought to take as its premise the idea that the skilled person reading Samsung would seek to implement the message using an 18 bit message conveying the type of information familiar from HSUPA, but with the presence of the message nevertheless operating a request for uplink capacity, at least implicitly. However the judge decided in paragraphs 172-175 that this secondary case still requires the step of considering OOK as a substitute and so, for the same reasons as before, the judge rejected that as obvious.
28. On appeal Lenovo contend that in this respect the judge overlooked an earlier finding he made (at paragraph 167) which meant that his approach in those paragraphs was in error. InterDigital contend that the judge gave cogent reasons for rejecting the secondary case and made no such error. They also argue that read in context paragraph 167 does not mean what Lenovo contend it means.

### *Grounds of appeal*

29. The first four grounds of appeal (grounds 1(a) to (d)) relate to the appeal against the failure of Lenovo's primary obvious case. I will take them in turn. Ground 1(e), relating to secondary evidence, was dropped. Then finally I will address ground 2, which relates to the secondary obviousness case.

*Ground 1(a) – The judge erred in failing to direct himself to have regard to the absence from the patent specification of any stated advantage of the inventive concept advanced by the patentee at trial.*

30. This ground requires a little unpacking. There is no general requirement that a patent needs to state what advantages an invention provides over the prior art. One reason why this is so is a practical consequence of an important piece of legal policy. The policy is that to be valid, a patent claim must satisfy the legal tests of novelty and inventive step over any prior art the party challenging validity cares to bring forward. Its consequence is that the person drafting the patent may well not be aware of the particular prior art which is pressed at trial. Inventions are often combinations of known features, say A, B and C. From one prior art starting point which disclosed (say) feature A, the advantage of the invention may seem to the inventor to derive from one of the other features of the combination. So a statement in the patent of the advantage provided by the invention may rightly focus on feature B. But then it may turn out at trial that the defendant pleads an item of prior art which discloses feature A and feature B, so suddenly the advantage given by B may not be so relevant after all. Feature C in the claim then takes on more significance. Since feature C is a feature of the claim, that claim only lacks inventive step if the combination of A, B and C is obvious. Therefore the patentee is entitled to rely on it. Adding C to A and B may or may not be obvious, but the rule against added matter (rightly) prevents the patentee from amending the patent after the event to write in new text which explains what the benefit of feature C would be over the combination of A and B.
31. It is very common for the prior art relied on in court to be something which the Patent Office which examined the patent application and granted the patent, did not find. Patent Offices around the world try hard to find the most relevant prior art but it is a difficult task. A person accused of infringement has a more acute motivation than a Patent Office, and in some cases deeper pockets, to find relevant prior art. The public as a whole benefits from that motivation, because it is in the public interest to revoke invalid patents just as it is in the public interest to uphold the validity of valid patents. So the policy is that any prior art can be relied on.
32. There are in fact important exceptions to this general rule that advantages need not be stated in the patent, but this explains why it is nevertheless the general rule. As the judge below recognised, there is no express requirement in the 1977 Patents Act to state advantages in a patent specification. If further authority were needed for the general rule, the landmark decision in *Conor v Angiotech* [2008] UKHL 49 in the House of Lords supports it. There Lord Hoffmann noted at paragraph 19 that there was no requirement in the Act or the Convention for the patent to explain why an invention will work or provide experimental proof that it does. These are subject to the question of plausibility, but that does not arise in this case.
33. One exception to this general rule relates to prejudice cases. The most recent Court of Appeal authority on the point is the judgment of Floyd LJ in *Philips v Asustek* [2019] EWCA Civ 2230 at paragraph 59, which refers back to Jacob LJ in *Pozzoli v BDMO* [2007] EWCA Civ 588 at paragraphs 25-29 (which in turn refer back to Jacob J in *Union Carbide v BP* [1998] RPC 1 at p13). It is a narrow (judge made) exception arising from quite specific circumstances. The reasoning works in the following way. The idea is that invention can lie in finding out that something which the skilled person thought should not be done, because they thought the idea would not work or be

impractical, in fact is practical. The idea that the known proposal was thought not to work is called a prejudice because even though the skilled person would conceive of the proposal, they would not implement it for that reason. Since the purpose of patent law is to provide incentives to innovation, one would expect there to be a patent incentive for dispelling a prejudice of this sort. However a simplistic analysis of the circumstances might lead one to conclude the invention was obvious, because in order for the skilled person to think something was impractical, they do have to have thought of it, and if they have thought of it, that seems to be a conclusion that it is obvious. So a more sophisticated approach is employed. The approach is to characterise the skilled person's thinking as including both the proposal and its impracticality. Then one can accept that invention can lie in dispelling the prejudice that the idea is impractical, but only if the invention disclosed in the patent does actually dispel the prejudice. In other words the patent document has to explain why the proposal is in fact practical. So in metaphorical terms, what was thought to be a "lion in the path" has turned out to be a "paper tiger".

34. That this is the law was, subject to one qualification, common ground between the parties, although its application to this case was not.
35. The qualification relates to the judgment of Arnold J in *Dyson v Samsung* [2009] EWHC 55 (Pat) at paragraphs 153-157, which counsel for the respondent handed up in oral argument. There Arnold J sitting at first instance considered the impact of *Conor* on the prejudice principle as stated in *Pozzoli*, and proposed a qualification to it. However since that time Floyd LJ in the Court of Appeal, who will have been well aware of *Conor*, gave the leading judgment in *Philips v Asustek* and in doing so the court affirmed the principle in its pre-*Dyson* form. For that reason and because, as I explain below, I believe the principle does not apply in this case in any event, there is no need to address *Dyson*.
36. The final point to be made on this issue is that it only arises if the prejudice relates to something which is a feature of the claim. It does not relate to proposals which are deployed as part of an obviousness attack but which are not themselves claim features. The facts of this case provide a clear illustration of the point. The primary obviousness case is that the skilled person starting from the idea of a message like the known 18 bit message, would decide to use a 1 bit message and would think of conveying that 1 bit using OOK. If it was argued that OOK would not be chosen because it was thought not to work, then the logic of the authorities on prejudice would bite because the skilled person would have to have thought of OOK in order to also decide to dismiss it as impractical, and so they could be regarded as having made the invention (since OOK is in effect claim feature 1D). Therefore the patent, to be valid, would have to dispel the prejudice and explain to the contrary why OOK can in fact be made to work. However if the argument is that 1 bit could not be made to work or was impractical, then the logic of the authorities does not bite at all. A skilled person who has got as far in their thinking as the idea of using a 1 bit message has not made the invention. So correspondingly a skilled person who thinks of 1 bit but dismisses it as impractical has not made the invention either. Therefore there is no need for the patent to dispel that prejudice and show how 1 bit can in fact be made to work.
37. In other words this prejudice principle is not a point which relates to any step in an obviousness argument, it only applies to proposals which are claim features.

*Application of the prejudice principle in this case*

38. Lenovo contends the principle applies in this case in the following way. Starting from the Samsung document, the step is feature 1D. Lenovo argues that the reasons advanced by InterDigital and accepted by the judge why each of the two elements at issue (to reduce the 18 bit message down to 1 bit and to use OOK to transmit the message) are not obvious, were based on technical prejudice points which are not dispelled by the patent. Therefore these reasons are not legally valid.
39. InterDigital submits, to the contrary, that none of the reasons relied on is a prejudice point at all and the principle does not apply.
40. One reason why this ground of appeal fails in relation to the argument about reducing the size of the message is the point of principle explained above, because the claim is not limited to a 1 bit message. However I will address the other arguments on this topic too, because I believe InterDigital is correct in submitting that the arguments are not prejudices of the relevant kind in any event. A clear example showing why not arises in the argument about reducing the message size. A reason advanced by Lenovo for decreasing the size of the message was to minimise the resource capacity needed for the control channel to carry such messages. An answer advanced by InterDigital was that the skilled person would not be motivated to do that because they would think that capacity in the non-contention channel could always be increased to accommodate an 18 bit message if so desired. Lenovo argues (appeal skeleton paragraph 58) that InterDigital cannot rely on that point because the patent does not explain why such a way of thinking was wrong. But it is Lenovo who are in error here. This line of thinking is not about whether a proposal is practical at all. The skilled person has no preconceived prejudice that (say) moving to a 1 bit message could not be made to work. The fact the patent does not discuss this sort of thing is irrelevant.
41. Another example relates to Dr Moss's evidence that going to a 1 bit message was a "backwards step" (because you lose the 18 bits of useful scheduling information). This is said to be legally irrelevant based on the prejudice principle because the patent positively contemplates at paragraph [0037] that it is optional whether the message contains further encoded bits of information. However again, the argument does not engage the principle either. Dr Moss is not saying that the proposal cannot be done. He is saying it can be done, but is unattractive (and he gave reasons why). This is not a relevant kind of prejudice.
42. Moreover none of this engages the second element of the obviousness case, namely the step of using OOK. The judge's main reason for rejecting that argument was hindsight, and the prejudice point does not relate to that at all.
43. A slightly different point was also advanced by Lenovo, based on ***Horne Engineering v Reliance*** [2000] FSR 90 (Pumfrey J). At paragraph 14 Pumfrey J said that "*it is often possible to deduce the attributes which the skilled man must possess from the assumptions which the specification clearly makes about his abilities.*" This is a true statement but it needs to be treated with care. Lenovo seek to deploy the point in the following way. Their assertion is that the patent, at paragraph [0037], treats the use of a "transmission burst" as part of the skilled person's toolkit that they would use without further explanation or assistance. Therefore, it is said, based on ***Horne***, that is how the prior art should have been approached.

44. In a way Lenovo's submission is true but only in a manner which does not help them. Paragraph [0037] has been mentioned already but it is now worth setting it out:

“[0037] Referring back again to Figure 4, the transmitted request in step 710 of Figure 7 may be a burst transmitted by one of the WTRUs 120 on its respective NCB channel (430, 440, or 450) requesting an allocation of UL physical resources whereby the presence of the burst itself is indicative of the resource allocation request for that particular WTRU 120. Alternatively, the burst may be an indication which, for example, may only include one bit of information, such as a "zero (0)" or a "one (1)" that indicates whether or not a resource allocation is needed. The burst may also include information related to the resource allocation request, such as the amount of UL data the particular WTRU 120 will need to transmit, the priority of the data, the QoS, latency requirement, BLER requirement and the like.”

45. This passage does assume that the skilled person, given this express instruction to use the presence of the transmission burst as indicative of the resource allocation, could do it. However the passage sheds no light on the thinking of a skilled person who has not been prompted to think about using a transmission burst in this way, because the text positively tells them to do it. If (which is not in issue) there was a debate whether a skilled person given only that instruction was capable of putting it into practice, then this might play a role in an argument about insufficiency, but that is not this case. Importantly the prior art document Samsung does not expressly teach the idea of using a transmission burst this way (subject to a different point arising on the secondary argument below).
46. A final, slightly different point again was taken about paragraph 114 of the judgment. Putting the paragraph in its context the judge said the following:

113. In closing Lenovo made a great deal about the absence from the Patent specification of any stated advantage of the inventive concept advanced by InterDigital at trial.

114. There is no statutory requirement that the invention claimed in a patent provides an advantage over the prior art (see s.1 of the Patents Act 1977 (“the Act”). If it does not, generally the invention may well not be used by third parties in which case the patent will probably not trouble the courts, but that is by the way.

115. A patent specification may set out a problem with the prior art technology, identify a solution and explain why the invention embodying that solution is an improvement over the prior art. But sometimes nothing may be said about any advantage in using the inventive concept as advanced at trial. One possible inference to be drawn is that between the drafting of the specification and the trial the patentee's idea of what the inventive concept is has moved on.

47. The judge then went on to recognise the prejudice principle as an exception to the general principle identified in paragraph 115, but Lenovo also criticise paragraph 114 and the last sentence in particular, on the ground that the existence of patents for inventions which do not provide advantages over the prior art is in conflict with another general principle of patent law, that the extent of the monopoly defined by the claims should correspond to the technical contribution to the art (citing Warner-Lambert v Mylan [2018] UKSC 56 at paragraph 17).
48. This Warner-Lambert principle is not in dispute. Moreover, it is manifest that the present invention is indeed useful and therefore satisfies the principle. After all it is an essential part of the 4G/LTE telecoms standard. The first sentence of paragraph 114 is accurate as a statement of what is provided for in the 1977 Act, and all of paragraph 115 is also correct. As a matter of emphasis, one might have mentioned the general principle that claim scope must equiparate with technical contribution, but that is a quibble. The aside in the second sentence of paragraph 114, whether it is justified by experience or not, does not matter.
49. I dismiss the appeal on ground 1(a).

*Ground 1(b) – The judge erred in holding that the skilled person would not have had a motivation to minimise resource allocation and to maximise the number of UEs that a cell could service.*

50. This ground relates to the basis for the judge’s rejection of Lenovo’s argument about going from an 18 bit message to a single bit.
51. The key problem for Lenovo was the judge’s finding at paragraph 166 that Prof Valenti “was of the view that the skilled person would have had an open mind on the topic, which does not imply a motivation one way or the other”. On appeal Lenovo takes two points. One is a submission that in principle open mindedness is not the same thing as lack of motivation, and the other is a submission that the judge misunderstood the Professor’s evidence, which was in fact that the skilled person would be motivated to do this.
52. I do not agree with either point. It is true that in the abstract an absence of motivation is not necessarily the same as open mindedness, however in context what the judge was doing was rejecting Lenovo’s case in the terms in which it had been put. In the immediately preceding paragraph 165 the judge accurately described Lenovo’s case as put in the following way:

165. Lenovo’s primary case was that it would have been obvious to reduce the size of the 18-bit message proposed by Samsung to a 1-bit message which solely by its presence indicated a scheduling request – OOK. The motivation was to minimise resource allocation and to maximise the number of UEs that a cell could service.

53. In other words it was said to be obvious to go from 18 bits to 1 bit because the skilled person would be positively motivated to do so in order to minimise resource allocation and to maximise the number of UEs. But in cross-examination (at T5/765) when pressed with part of Dr Moss’s evidence on which InterDigital relied, that in context

the difference between 18 bits and 1 bit was not significant, the most Prof Valenti said was that the skilled designer “might” want to have a design that minimised the size of message and added “There are trade offs. You can make a case for either. I could see a skilled designer picking either option, really.”

54. In my judgment this amply supports the judge’s finding that Prof Valenti’s view was that the skilled person had an open mind, that this did not support Lenovo’s case that factors they relied on would positively motivate the skilled person to take a 1 bit approach, and that without such a motivation the approach relied on was not an obvious one.
55. I have dealt with and rejected the other way Lenovo put its case about moving from 18 bits to 1 bit, under ground 1(a) above. I would dismiss ground 1(b).

*Ground 1 (c) – failing to identify that, on his factual findings, on/off keying (“OOK”) was an old idea not thought to be of practical utility in cellular networks but this could not be relied upon in support of inventiveness because the Patent did not show it to be practical, contrary to the prejudice.*

56. I have addressed the prejudice principle at length already. The short answer to this ground is that the idea that OOK was impractical or could not be made to work was no part of the judge’s reasoning. The finding about the status of OOK was that it was part of the common general knowledge but the skilled person would not be aware of any use in a cellular network implemented up to the relevant date. The relevant paragraph (71) is quoted above. This is quite different from a finding that it was thought to be something which could not be made to work. So the premise of this ground of appeal is unpromising.
57. Moreover, the judge did not find that the skilled person would indeed have the idea of using OOK to convey the scheduling request but would also dismiss it as unworkable or impractical. On the contrary his conclusion, amply supported by the evidence, was in effect that although of course the skilled person could have thought of employing OOK since it was part of the common general knowledge, that conclusion was tainted with hindsight. After all OOK was an old basic technique, seldom used in modern systems.
58. There is nothing in this ground.

*Ground 1 (d) – holding that the skilled person at the priority date would not have been aware of any use of OOK in a cellular network implemented up to that date.*

59. This argument is based on an apparent inconsistency between the conclusion about what was the common general knowledge of OOK (at paragraph 71) and earlier paragraphs in the same section of the judgment, at 62-65. Lenovo’s submission is that in these earlier paragraphs the judge identifies a UMTS text book (*HSDPA/HSUPA for UMTS* by Holma & Toskala) which describes a particular scheme which is part of that system, and characterises that scheme as OOK. The scheme is for sending positive and negative acknowledgements (ACKs and NACKs) in a situation called soft-handover when a mobile is in communication with more than one cell. Lenovo then submits that the judge found that the contents of this textbook represented the skilled person’s common general knowledge. Therefore, submits Lenovo, the judge erred in his

conclusion at paragraph 71 that the skilled person would not have been aware of any use of OOK in a cellular network implemented at the relevant date.

60. On the face of it, this would have been a curious error for an experienced patent judge like HHJ Hacon to make given that the relevant paragraphs are all together in a section on OOK, but we all make mistakes and superficially Lenovo have a point.
61. I am satisfied that there is no error here and the judge's conclusion should stand. The reasons are these. As counsel for InterDigital showed, the section in the judgment on OOK in fact divides into two parts. The textbook passage is in the first part, from paragraphs 59-65. Here the judge was resolving a debate about terminology, answering the question – how broadly could OOK be defined? Then from paragraphs 66 to 71 the judge addressed what he (correctly) called the “more significant issue” of “the common general knowledge about applications to which OOK could be put”. It was at the end of that section that the judge reached his important conclusions about the common general knowledge of OOK.
62. The terminology point was a debate between the experts and in the first section the judge resolved it as best he could (in fact concluding that the skilled person would be aware that some in the field used the term narrowly and others widely).
63. In the textbook the authors had described the scheme as OOK, and Prof Valenti said it was within his wider definition of OOK. However to the contrary Dr Moss said it was not within his more narrow conception of OOK. The reason why not was because it did not use a sinusoidal modulation signal, but nothing now turns on that.
64. The textbook was actually post-published, a few months after the priority date, therefore it might be thought to have had no evidential value anyway. However the judge noted an acceptance in cross-examination by Dr Moss that despite its date the book “distilled what the skilled person would have known at the priority date”. So submits Lenovo – here is a finding that the content of the book is common general knowledge and since the book contains the scheme and calls it OOK, paragraph 71 is wrong. Now before going any further, the issue is not whether this aspect of soft handover, as a scheme, was part of the common general knowledge. It was part of the 3GPP standards and Dr Moss's view was that what was in the standards at the time was common general knowledge. The fact the scheme itself was common general knowledge is not inconsistent with paragraph 71. An alleged inconsistency only begins to get off the ground if the scheme had been positively identified as OOK as a matter of common general knowledge. If so then there could be an inconsistency with paragraph 71.
65. However, neither side had called evidence that this characterisation of this particular scheme was part of the common general knowledge. In his first expert's report Dr Moss had given evidence that an earlier, different textbook by the same authors (Holma & Toskala, *WCDMA for UMTS*) was a source of common general knowledge, but that was not relevant on this point. Dr Valenti had given evidence that certain other specific parts of the post-published book were part of the common general knowledge, but he did not draw attention to this passage, and did not assert that the passage or the post-published textbook as a whole was common general knowledge. Dr Moss was asked about the status of the post-published textbook in cross-examination. However neither the question posed nor the answer given by Dr Moss, was focussed on the relevant

passage describing the scheme. They related to the book as a whole, other parts of which were, as explained above, said to be common general knowledge.

66. InterDigital submitted that the word “distilled” itself did not mean that everything in the textbook was common general knowledge and so in a narrow linguistic sense Lenovo’s argument is wrong in its own terms. I see that, but it is not the only basis for rejecting Lenovo’s argument. The real problems with Lenovo’s submission are that the judge was not being asked to make a finding that this passage describing the scheme was part of the common general knowledge, indeed the judge recognised that Dr Valenti had called the scheme “a little complicated and not the best example”. The judge’s finding that the book distilled what the skilled person would have known was a finding related to the scope of the meaning of the term OOK, that is all. Such a finding could have supported a further finding that if a skilled person had been asked whether the scheme they knew in the standard was a kind of OOK, they would have agreed that it could be seen that way, but the step of addressing a finding of that kind was not taken. Still less did the judge take the subsequent step of examining (without hindsight) whether skilled people had the scheme in mind as OOK as a matter of common general knowledge. Moreover the judge’s final conclusion on meaning did not go far enough to support this whole logical chain anyway, because his overall conclusion was not that the skilled person used the wide meaning, but that they would be aware that some used the term narrowly and others widely. Properly understood the judgment does not purport to decide whether this scheme, characterised as OOK, is common general knowledge and makes no finding that it is. Therefore there is no inconsistency in the judgment on this point.
67. Thus the judge’s conclusion at para 71, that the skilled person would not have been aware of any use of OOK in a cellular network implemented up to the priority date, was a sound one. This ground of appeal fails.

*Ground 2 – the secondary obviousness case*

68. The judge considered and rejected the secondary case in paragraphs 172-175. Lenovo challenge the judge’s rejection on a single ground, as follows:

The Judge erred in rejecting the Defendants’ secondary case on obviousness in light of Samsung; a finding of obviousness on this basis necessarily followed from the findings already made in relation to Lenovo’s primary case on obviousness.

69. The argument here is similar to ground 1(d), in that here again Lenovo contend that a conclusion reached by the judge, this time the one rejecting the secondary case, is inconsistent with a finding made earlier (in paragraph 167). Like ground 1(d) it requires some unpacking.
70. The secondary argument was a hedge against the failure of the primary case. The argument was the contention that even if it was not obvious to move from an 18 bit message to 1 bit message, the claim was still the obvious result of implementing the 18 bit E-DCH SI-like message approach.
71. The secondary case seems to have been somewhat of an afterthought, although that alone is no reason to ignore it. It is important to see that the secondary case in fact

contains two subtly distinct arguments. One argument is that the skilled person reading Samsung would have the idea that the 18 bit message itself could serve as a scheduling request solely by the fact of its being sent. The other argument is that Samsung positively discloses that concept (implicitly or explicitly). The distinction between these two arguments is that the first one involves the skilled person adding the idea of using OOK to what is disclosed in Samsung, while the second one does not. The second argument in effect is that OOK is already there in Samsung – albeit perhaps only implicitly.

72. The first argument is the way the judge characterised Lenovo’s secondary case at paragraph 132. It is vulnerable to the same problem as the primary case – that the idea of the skilled person coming up with OOK is tainted with hindsight, and if that is all there is to it then there is no sound basis for interfering with the conclusion.
73. However if the second argument is sound, then the hindsight problem does not arise because the argument is not concerned with whether the skilled person would think of adding OOK to the proposed scheme, it is already there.
74. It is notable that if the second argument is correct then one might wonder what all the preceding analysis had been about. If Samsung does actually disclose, implicitly or explicitly, the proposal to use the *presence* (my emphasis) of the 18 bit message as a request for uplink capacity then that would indeed mean the claim was invalid. However it would be invalid because claim feature 1D was disclosed by Samsung, contrary to the judge’s express finding at the start of the obviousness analysis at paragraph 128 (and see also paragraph 130), that it was not.
75. Although he did not put it in these terms, the judge clearly understood the distinction between the first and second arguments. In paragraphs 172-174 the judge recognised that Prof Valenti was suggesting that Samsung disclosed the idea that the presence of the 18 bit message could of itself be an implicit request for uplink capacity (the second argument). The judge rejected that conclusion for a number of reasons. One was that Prof Valenti had supported his view by reference to paragraph [0037] of the patent, but as the judge rightly held that was irrelevant since the skilled person would not have read the patent. Another was (also rightly) that in HSUPA, which is where the idea of the E-DCH SI message comes from, the signalling does not work that way. Rather that function is provided by the happy bit.
76. Therefore (in paragraph 174) the judge concludes that Lenovo’s secondary case would still require the skilled person to think of changing what was disclosed by Samsung (in other words that all that was left was the first argument), and so that is why he rejected the secondary case at paragraph 175 for the same reason as the primary case.
77. The alleged inconsistency is with a finding made earlier when the judge was addressing the thinking of the skilled person given Samsung:

“167. I think the starting point for a skilled person considering the E-DCH SI-like message of option (b) in section 3.2 of Samsung would have been to think of the familiar E-DCH SI message of HSUPA. That was an 18-bit message containing scheduling information and without a bit identifying the message as a scheduling request. That function was provided by the

happy bit sent on the E-DPCCH. Option (b) indicates that its proposed message is not the same, in that sending the message serves as a mechanism for asking for UL resources, although that could be done by a signal within the message.”

78. The submission is that here the judge is finding that Samsung is teaching the idea of using the message as the mechanism for asking for uplink resources. So far so good. Lenovo then contends that the last sentence of the paragraph refers to two approaches. The latter approach is within the phrase which starts with the word “although” and involves including a further bit in the message identifying it as a scheduling request (which is what the final sentence refers to as a signal within the message). This approach would not involve OOK and does not advance Lenovo’s case. However Lenovo argues that the first part of the sentence is a finding that Samsung is disclosing the approach of using the presence of the message itself as the request. In other words that it discloses using OOK, albeit implicitly. That is, argues Lenovo, what this sentence means in context. Therefore it is a finding which is inconsistent with the reasoning in later paragraphs 172-175, since it is a finding that Samsung does in fact disclose an approach which involves OOK.
79. Lenovo’s construction of the last sentence of paragraph 167 is not untenable but read in context and taking the judgment as a whole, in my judgment it is wrong. For one thing if it is what the judge thought he was doing in that paragraph, it makes the later reasoning very odd.
80. I believe the right construction of the sentence is as follows. The most the words of the first part of the sentence (before the word “although”) can bear is that they are a finding that Samsung does disclose the idea of using the message as the mechanism for asking for uplink resources. So far this says nothing about how that is to be achieved. Nevertheless given that conclusion, one might be tempted to think Lenovo is correct that it necessarily follows that Samsung is implicitly disclosing an approach based on OOK because, as we can see today looking back with hindsight, there are only two ways of putting that idea into practice. One of them is where a signal is put inside the message identifying it as such, and the other is OOK. However in the second part of the sentence – following the word “although” – the judge does not complete that thought in that way. I believe the point the judge was making by saying “although” was that Lenovo’s conclusion did not follow from the premise, precisely because by including a signal within the message, the message could indeed be used as the mechanism for asking for uplink resources. In other words if anything here the judge was actually rejecting Lenovo’s argument. The fact that Samsung does teach using the message as a mechanism for asking for uplink resources does not necessarily disclose (explicitly or implicitly) a scheme in which the request is communicated by the fact of the message as opposed to its contents. There is a perfectly good way of putting the proposal into practice, and that method does not involve OOK. There is no finding that the alternative, which does involve OOK, is necessarily disclosed. Putting it another way, there is no finding that the skilled person would interpret Samsung as a proposal to use the message as the mechanism for asking for uplink resources without adding a signal into the message to identify it as a scheduling request.
81. Accordingly there is no inconsistency between paragraph 167 and the judge’s reasoning which rejected the secondary case in paragraphs 172-175. This ground of appeal fails.

*The appeal overall*

82. I have been through the grounds of appeal individually and rejected them. Standing back and looking at the judge's conclusions rejecting Lenovo's case of obviousness, they are conclusions amply supported by the evidence, involving no error with which this court could interfere and the judge reached a result which was well within the range of outcomes open to him. I would dismiss this appeal. There is no need to consider the respondent's notice.

**Lord Justice Warby:**

83. I agree that the appeal should be dismissed for the reasons given by Birss LJ.

**Lady Justice Falk:**

84. I also agree.