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Case No: CA-2022-001060

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 (ChD),
PATENTS COURT

Mr Justice Mellor

[2022] EWHC 10 (Pat)

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 9 February 2023

Before :

LORD JUSTICE LEWISON

LADY JUSTICE ASPLIN

and

LORD JUSTICE ARNOLD

Between :

**(1) INTERDIGITAL TECHNOLOGY
CORPORATION**

**Claimants/
Appellants**

(2) INTERDIGITAL PATEN HOLDINGS, INC

(3) INTERDIGITAL, INC

(4) INTERDIGITAL HOLDINGS, INC

- and -

(1) LENOVO GROUP LIMITED

**Defendants/
Respondents**

(2) LENOVO (UNITED STATES) INC

**(3) LENOVO TECHNOLOGY (UNITED KINGDOM
LIMITED**

(4) MOTOROLA MOBILITY LLC

(5) MOTOROLA MOBILITY UK LIMITED

Adrian Speck KC (instructed by **Gowling WLG (UK) LLP**) for the **Appellants**
James Abrahams KC and Kyra Nezami (instructed by **Kirkland & Ellis International LLP**)
for the **Respondents**

Hearing dates : 31 January – 1 February 2023

Approved Judgment

This judgment was handed down by the Court remotely by circulation to the parties' representatives by email and release to The National Archives. The date and time for hand-down is deemed to be 10:30 on 9 February 2023.

Lord Justice Arnold:

Introduction

1. This is an appeal by the Claimants (“InterDigital”) from an order of Mellor J dated 29 April 2022 revoking European Patent (UK) No. 3 355 537 (“the Patent”) for the reasons given in the judge’s judgment dated 6 January 2022 [2022] EWHC 10 (Pat). The judge’s decision was made following the second technical trial (Trial B) between InterDigital and the Defendants (“Lenovo”) in their dispute over the terms of a FRAND licence of InterDigital’s portfolio of allegedly standard-essential patents.
2. The Patent is entitled “MAC Multiplexing and TFC Selection Procedure for Enhanced Uplink”. MAC stands for Medium Access Control, which is part of layer 2 in the OSI 7-layer model. TFC stands for Transport Format Combination. TFCs are used to regulate data transmission in the physical layer, layer 1. As the title indicates, the claimed invention concerns an aspect of Enhanced Uplink (EU), also referred to as High Speed Uplink Packet Access (HSUPA). At the priority date of the Patent, 29 April 2005, stage 2 of HSUPA was being developed for release 6 of the 3G UMTS mobile telecommunications standard, but it had not been finalised. InterDigital contend that the Patent is essential to release 6 as subsequently finalised, and subsequent releases.
3. As the judge explained at [3]:

“This case concerns the way in which in HSUPA it was proposed that data were assembled for transmission on the physical layer (PHY). Only data blocks of certain pre-determined sizes (called E-TFCs) are allowed to be transmitted. Furthermore, the amounts of data which could be sent on the Enhanced Uplink were controlled. The ‘useful’ data to be sent did not necessarily match an allowed E-TFC, so the system was one in which padding bits were added to ensure the E-TFC was filled. The Patent is concerned with minimising the amount of padding which is sent by adjusting or quantising the amount of data multiplexed into an E-TFC to more closely match the E-TFC size. There are different ways of doing this, none of which provide a perfect solution. The differences arise from (a) what limits are chosen, (b) how they are used and (c) the point in the sequence that various limits are applied.”
4. The judge held that the Patent would be essential to the standard and infringed if valid; but that it was invalid because all the claims lacked novelty over a marked-up version of 3GPP TS 25.309 v6.2.0 entitled “FDD Enhanced Uplink; Overall Description; Stage 2 (Release 6)” (“Filiatrault”) which was circulated by the editor, Charles Filiatrault, to the members of Radio Access Network Working Group 2 on 27 April 2005, two days before the priority date. Filiatrault contains various additions to and deletions from v6.2.0 (referred to by the judge as “the Prior Specification”), which had been published on 24 March 2005.

5. The resolution of the appeal turns primarily upon a single question of claim construction. As is not infrequently the case on appeals to this Court, an issue which received relatively little attention in the court below occupied centre stage before us.
6. Although there were three issues of claim construction which were mainly relevant to essentiality and infringement, and which the judge determined in favour of InterDigital, the principal dispute before the judge was as to the disclosure of Filiatrault. As the judge explained, in the first round of expert evidence, the parties' respective experts (Jonathan Townend for InterDigital and Dr James Irvine for Lenovo) set out diametrically opposed views as to what Filiatrault disclosed. The differences between them were explored in two further rounds of written evidence and in cross-examination. Furthermore, Lenovo's case on Filiatrault changed during the trial. As the judge commented, a case which undergoes repeated change does not inspire confidence. Lenovo ended up arguing that the claims were invalid over Filiatrault on no less than four bases: the first and fourth were allegations of anticipation and the second and third were allegations of obviousness. Furthermore, the first case embraced a number of different arguments. The judge held that InterDigital's interpretation of Filiatrault was correct and rejected the first three ways in which Lenovo put their case, but accepted the fourth. As InterDigital point out, that was based upon an illustrative document referred to as DXX/14 which was first produced by Lenovo for the purposes of the cross-examination of Mr Townend and was not foreshadowed in either Dr Irvine's evidence or Lenovo's skeleton argument. As Lenovo point out, however, the case based on DXX/14 which the judge accepted was based upon InterDigital's reading of Filiatrault. Lenovo say that it was also based upon InterDigital's construction of the claims, but InterDigital dispute this.
7. On the appeal InterDigital contend that the judge correctly interpreted the claims when determining the issues of claim construction and essentiality/infringement and when rejecting Lenovo's first three cases based on Filiatrault, but inadvertently applied a different and incorrect interpretation when accepting Lenovo's fourth case. Lenovo dispute this. In the alternative, Lenovo advance by way of respondents' notice a claim construction under which the claims would not be essential or infringed.

The skilled person

8. The judge recorded that the parties agreed that the skilled person would be a systems engineer working on HSUPA technologies and focussed on the MAC layer. The skilled person would be aware of the relevant 3GPP technical specifications and be able to refer to them for details as needed. These included the latest versions of the MAC specification (TS 25.321 v6.4.0) and the HSUPA stage 2 overall description (the Prior Specification).

Technical background

9. The judge set out the technical background to the Patent at [14]-[119]. I shall take that necessarily detailed exposition as read, but for convenience the points that matter for present purposes may be briefly and simplistically summarised as follows.
10. The Prior Specification for HSUPA provided a mobile device with a new uplink channel called the "enhanced" dedicated channel (E-DCH). This new channel is realised through a new logical entity, the MAC-e, whose purpose is to construct a

packet called a MAC-e PDU for transmission on the E-DCH, which is passed to the physical layer to be sent in each transmission. The time window in which each transmission is made is called a Transmission Time Interval (TTI).

11. The MAC-e entity uses packets of data called MAC-d PDUs passed to it from an existing logical entity called the MAC-d to assemble the MAC-e PDU. This means that the data to be assembled into the MAC-e PDU is presented to the MAC-e entity in discrete blocks, each a MAC-d PDU. There is not a continuous stream of data allowing any quantity of data to be taken. The process performed by the MAC-e of taking these blocks (together with a header) and assembling a MAC-e PDU is called multiplexing.
12. By the priority date different types of data were to be dealt with by separate allocations of resources. The proposed standard had evolved to accommodate a category known as “scheduled data” and multiple categories known collectively as “non-scheduled data”. As the judge explained, the terminology of “scheduled” and “non-scheduled” data is somewhat counterintuitive because non-scheduled transmissions are able to be made on a predictable basis, and scheduled transmissions not so. The naming reflects the fact that the scheduled transmissions are scheduled by the base station (Node B in UMTS), whereas non-scheduled transmissions are specified by the serving Radio Network Controller (RNC) (i.e. the RNC which controls Radio Resource Control (RRC) signalling for a UE) and are not the subject of Node B-controlled scheduling.
13. The quantity of data from each category that can be multiplexed into the MAC-e PDU in each TTI is controlled through the use of “grants” which allocate a given amount of resource to each category. There is a single scheduled grant (applicable to scheduled data) and one or more non-scheduled grants applicable to non-scheduled data on specific MAC-d flows. Each grant is an individual limit on the amount of data from each category of data that can be taken by the MAC-e entity and multiplexed into the MAC-e PDU.
14. The amount of data that is actually multiplexed according to each grant may be less than the grant. This is due to the fact that data is provided in discrete blocks. No further data may be multiplexed from any category if adding an additional MAC-d PDU will result in more data of the particular category than is allowed by the grant applicable to it. Any remaining grant for that category will then remain unused.
15. A complete MAC-e PDU is sent in one of a limited number of envelopes known as Enhanced Transport Format Combinations (E-TFCs) which are of particular sizes. At any one time a subset of E-TFCs may be available to be used. The process of identifying the available subset of E-TFCs is known as “E-TFC restriction”. The process of identifying the E-TFC that is to be used is called “E-TFC selection”.
16. On an E-DCH, ordinarily the overall total data multiplexed into a MAC-e PDU will not precisely equal the size of an available E-TFC (sometimes referred to as a transport block (TB)). The approach adopted in Filiatrault is to select the nearest larger E-TFC, and to fill up the remaining space with padding bits. Padding bits are necessary for this purpose, but undesirable for two reasons. First, they do not comprise useful data. Second, they contribute to interference between the UE and other UEs at the air interface.

17. Thus the system as developed by the priority date operated by multiplexing data in discrete blocks from different categories of data up to, but not exceeding, the grants separately applicable to the category to which the data belonged. After multiplexing was complete and the overall size of data in the MAC-e PDU was known, an E-TFC was then identified which was the next larger of those in the available set than the size of the multiplexed data. There was no multiplexing limit applied to the data as a whole, and an E-TFC was not identified for use until after the multiplexing was complete. Indeed, it was identified after multiplexing because it had to be the next largest E-TFC so as to accommodate the data that had been multiplexed.

The Patent

18. The judge summarised the teaching of the Patent at [120]-[146]. Again, I shall take that summary as read. For present purposes it is sufficient to highlight the following points.

19. The background to the invention is described in the specification at [0002]-[0017]. The passage at [0002]-[0014] is based either on Filiatrault or an earlier version of TS 25.309. At [0015]-[0017] the specification explains some of the disadvantages of the prior scheme, such as the need for padding. In particular, the specification notes at [0016] that, in some circumstances:

“... padding required to match the selected E-TFC may exceed the multiplexing block size of MAC-d flow data including associated MAC-e header information. In this case, the effective data rate is unnecessarily reduced from what is allowed by the selected E-TFC and the physical resources required for its transmission.”

20. The inventive concept is summarised at [0018]-[0020]. In short, the amount of data to be transmitted is to be “quantized” (adjusted) to make the amount of data multiplexed into a MAC-e PDU more closely match an E-TFC transport block size.
21. The detailed description begins at [0022]. The basic idea of quantizing the multiplexing limit set by the grants to match a selected E-TFC size is explained at [0025] and [0026] by reference to two embodiments illustrated diagrammatically in Figures 4 and 5. As the judge explained at [127]:

“... Both comprise three steps:

- (a) First, the UE receives a ‘*scheduled data grant from a Node B and/or non-scheduled grants from an RNC*’.
- (b) Second, ‘*an E-TFC transport block size is selected based on the amount of data allowed to be multiplexed according to the scheduled and non-scheduled grants*’.
- (c) [Third, h]aving selected an E-TFC based on the grants, Figure 4 requires the amount of data allowed to be transmitted by the grants to be quantized so that the amount of data multiplexed more closely matches the selected E-TFC. In view of one of the construction points

which I discuss later, it is to be noted that the quantizing step is described in [0026] ‘so that the sum of the scheduled and non-scheduled data (including MAC header and control information) is multiplexed into each EU MAC-e PDU more closely matches the selected E-TFC transport block size’.

...

- (e) In either case, the outcome is that the UE has identified an E-TFC based on the amount of data allowed by the grants, and modified the amount of data that can be multiplexed into it (i.e. it has adjusted, or ‘quantized’, the multiplexing limit set by the grants).”

22. Thus, as the judge noted at [128(f)]:

“The Patent introduces the idea ... of selecting an E-TFC based on the grants (rather than selecting an E-TFC based on the data multiplexed into a MAC-e PDU in accordance with the grants), and creating a MAC-e PDU in accordance with that selected E-TFC.”

23. The specification goes on to describe three schemes: (i) a scheme which Mr Townend called the “next smaller” scheme and which Dr Irvine called “round down”; (ii) a scheme which Mr Townend called the “multiplex then select” scheme and Dr Irvine called “round nearest”; and (iii) a scheme which Mr Townend called the “next larger” scheme and which Dr Irvine called “round up”. The claims are based upon the next smaller or round down scheme. This is outlined at [0028]-[0029] by reference to Figures 6 and 7, with further detail being provided in [0043]-[0047] by reference to Figures 11A and 11B.

24. Figure 6 is reproduced below.

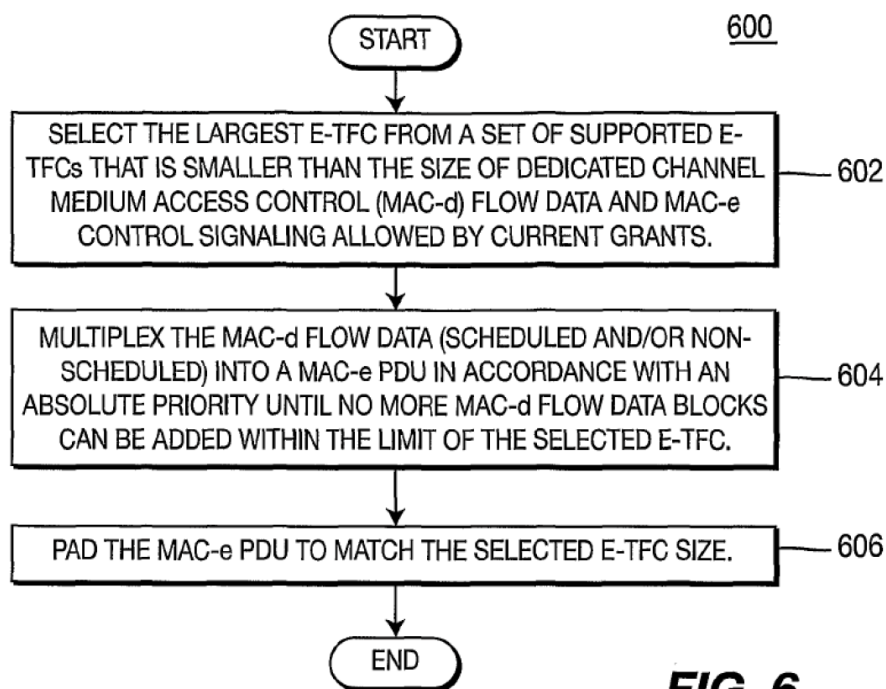


FIG. 6

25. The specification explains at [0028] (with emphasis added by the judge):

“Figure 6 is a flow diagram of a process 600 for generating a MAC-e PDU in accordance with another embodiment. A largest E-TFC is selected from a set of supported E-TFCs that is smaller than the size of MAC-d flow data and MAC-e control signaling allowed by current grants 602. As a result, the selected E-TFC permits a decreased amount of data to be multiplexed onto the MAC-e PDU relative to the amount allowed by the grants, to more closely match the largest E-TFC size that is smaller than the amount required by scheduled and non-scheduled grants. The MAC-d flow data (scheduled and/or non-scheduled) is multiplexed into a MAC-e PDU in accordance with an absolute priority until no more MAC-d flow data blocks can be added within the limit of the selected E-TFC 604. The MAC-e PDU is padded to match the selected E-TFC size 606.”

26. Figure 7 is reproduced below.

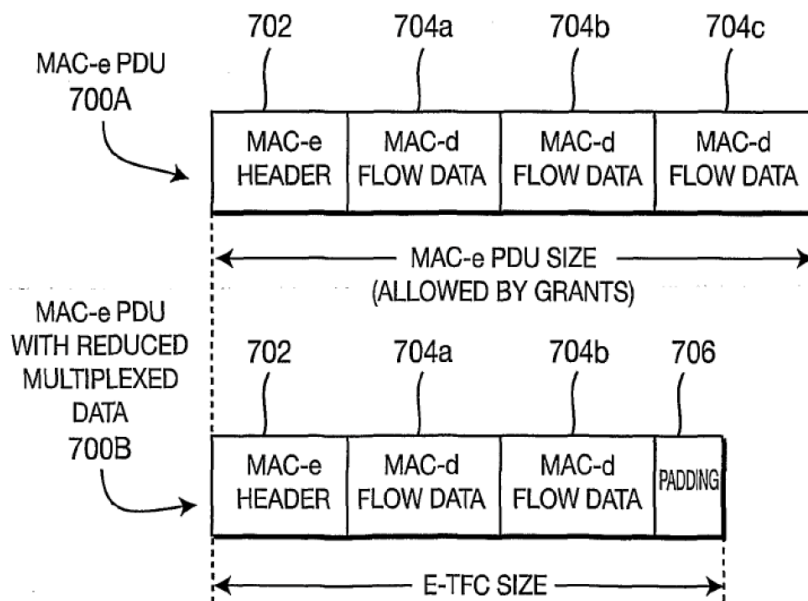


FIG. 7

27. The specification explains at [0029]:

“Figure 7 illustrates the decreased MAC-e PDU 700B size that more closely matches a selected E-TFC size in accordance with the embodiment of Figure 6. A MAC-e PDU header 702 and MAC-d flow data blocks 704a-704c are supported by the current scheduled and non-scheduled grants. Referring to Figures 6 and 7, the largest E-TFC that is smaller than the size of MAC-d flow data allowed by current grants is selected from the set of supported E-TFCs (step 602). MAC-d flow data blocks, (in this example, the two MAC-d flow data blocks, 704a, 704b), are multiplexed into the MAC-e PDU 700B in

accordance with an absolute priority until no more MAC-d flow data blocks can be added within the limit of the selected E-TFC size (step 604). MAC-d flow data block 704c is not multiplexed since it will exceed the limit of the selected E-TFC. Preferably, only the amount of multiplexed scheduled data is adjusted to more closely match the selected E-TFC size. Padding 706 is then applied to the MAC-e PDU 700B to match the selected E-TFC size (step 606). ...”

28. It is common ground that this scheme may well result in a reduction in the data sent by an individual UE and an increase in the padding. To that extent, it may seem both contrary to the Patent’s stated objective and counterintuitive. As is also common ground, however, the scheme is beneficial across all the UEs operating in a cell since it reduces the amount of padding across the cell. This is because it prevents the padding required to match the selected E-TFC exceeding the multiplexing block size of MAC-d flow data.

The claims

29. The claims of the Patent are rather wordy because they incorporate a number of definitions and abbreviations. Stripped of excess verbiage and broken down into integers in the manner agreed between the parties at trial and adopted by the judge in his judgment, claim 1 is as follows:

“[1A] A WTRU comprising:

[1B] means for receiving at least one serving grant and at least one non-scheduled grant,

[1C] wherein the at least one serving grant is a grant for scheduled data transmission

[1D] and the at least one non-scheduled grant is a grant for non-scheduled data transmission,

characterized by:

[1E] means for determining supported E-TFCs, within a E-TFC set, based on a remaining transmit power for enhanced uplink transmission; and

[1F] means for limiting MAC-d flow data multiplexed into a MAC-e PDU, to a largest E-TFC size that is smaller than a size of MAC-d flow data allowed by the received serving and non-scheduled grants and available for transmission.”

30. The WTRU (wireless transmit/receive unit) of claim 1 is what UMTS refers to as a UE (User Equipment) i.e. a mobile device.

31. Claim 2 is:

“The WTRU of claim 1 further comprising: means for selecting a smallest possible E-TFC that is required to support the amount of data allowed to be multiplexed by the at least one of the serving and non-scheduled grants.”

32. Claim 5 is:

“[5A] A method for multiplexing data implemented by a WTRU, the method comprising:

[5B] receiving at least one serving grant and at least one non-scheduled grant,

[5C] wherein the at least one serving grant is a grant for scheduled data transmission

[5D] and the at least one non-scheduled grant is a grant for non-scheduled data transmission,

characterized by:

[5E] determining supported E-TFCs, within a E-TFC set, based on a remaining transmit power for enhanced uplink transmission; and

[5F] limiting MAC-d flow data multiplexed into a MAC-e PDU, to the largest E-TFC size that is smaller than a size of MAC-d flow data allowed by the received serving and non-scheduled grants and available for transmission.”

33. Claim 6 is:

“The method of claim 5 further comprising: selecting a smallest possible E-TFC that is required to support the amount of data allowed to be multiplexed by the at least one of the serving and non-scheduled grants.”

Principles of claim interpretation

34. There was no dispute between the parties either before the judge or before this Court as to the principles of claim interpretation. In short, the words of the claim must be interpreted from the perspective of the skilled person in the light of their common general knowledge and having regard to the inventor’s purpose.

The judge’s interpretation of the claims

35. The judge explained that there were three issues as to the construction of claim 1, all of which concerned integer 1F. The first two issues are no longer live, and so it is unnecessary to say anything about them. The judge said this about the third issue:

“‘means for’

181. Lenovo argue that the means in integer 1F form part of a scheme such that the means must operate all the time. For its part, IDC makes the conventional argument that provided the apparatus has the requisite means, it infringes even if the means are employed only some of the time.
182. This argument arises because in the Standard as implemented, the integer 1F means are employed when scheduled data is to be transmitted but not for the transmission of non-scheduled data alone. Since there will be occasions where only non-scheduled data are sent, Lenovo argue that there is no infringement.
183. Lenovo's argument is wrong. It is not necessary in this apparatus claim that the means in integer 1F must operate all the time. The accused products have means as specified in claim 1, including in integer 1F. Even if I assume this argument works in claim 1, Lenovo would infringe and would be responsible for multiple infringements of claim 5, the method equivalent to claim 1.
184. My finding has consequences however because this integer 1F is expressed in very broad terms: it is satisfied by any means which bring about the stated result."

Filiatrault

36. The judge explained the nature of Filiatrault at [256]:

"One of the reasons why the disclosure of Filiatrault was open to the arguments deployed in this case was because the document represents a snapshot at a particular point in time of the development of the enhanced uplink functionality. It is plainly a document which was a work in progress. Sometimes it indicates this expressly by saying a particular topic was FFS - for further study. Other parts were not marked FFS but were clearly still in development. There are also parts which were introduced at an earlier stage and one has to question whether they needed to be changed to reflect later developments. Furthermore, the document was a work in progress towards a finalised Stage 2 specification, the details of which would be worked on in a Stage 3 document. These points have three important consequences. First, Filiatrault has passages which clearly derive from earlier drafts of the specification when certain features had not been incorporated. Second, it is unsafe to treat Filiatrault as fully worked out or even necessarily internally consistent. Third, parts of Filiatrault are open to interpretation as to precisely how the concepts described would actually be implemented."

37. It was common ground before the judge that Filiatrault disclosed features 1A to 1E of claim 1 of the Patent. The issue was whether it disclosed (or made obvious) feature 1F. The judge explained how Lenovo's case as to the disclosure of Filiatrault changed during the course of the trial at [225]-[252]. In that context he summarised the structure of the relevant sections of Filiatrault and quoted certain passages relied upon by Lenovo. He went to consider the first way in which Lenovo put their case at [254]-[301], and in that context considered various other passages of Filiatrault.
38. Fortunately, none of this detail matters for the purposes of the appeal. There is no challenge by Lenovo to the judge's decision that Filiatrault is to be interpreted in the manner contended for by InterDigital. Accordingly, it is common ground that it is sufficient to focus on the difference identified by Mr Townend between Filiatrault and the claimed invention. As explained below, the judge agreed with Mr Townend's analysis, and therefore concluded that the claims were novel over Filiatrault subject to the issue arising out of DXX/14.

The difference between Filiatrault and the claimed invention identified by Mr Townend

39. Mr Townend attempted to encapsulate what he saw as the difference between Filiatrault and the claimed invention in his first report as follows:

“305. The invention claimed in the Patent is therefore different from the disclosure in Filiatrault because:

- (a) Filiatrault uses the grants as a multiplexing limit in a MAC-e PDU and then selects the smallest E-TFC which is larger than the multiplexed data, and adds any necessary padding. This allows the selected E-TFC to be larger than the sum of the grants, and/or the padding to be larger than a MAC-d PDU which could otherwise be sent.
- (b) The claimed invention in the Patent uses the grants as a limit on the largest E-TFC which can be used and then uses the size of that largest E-TFC as a multiplexing limit. This guarantees that the selected E-TFC (i.e.: the multiplexed data, the headers, and any padding that comprise the MAC-e PDU) will not be larger than the sum of the grants, nor will the size of padding be greater than the size of a MAC-d PDU which could otherwise be sent.

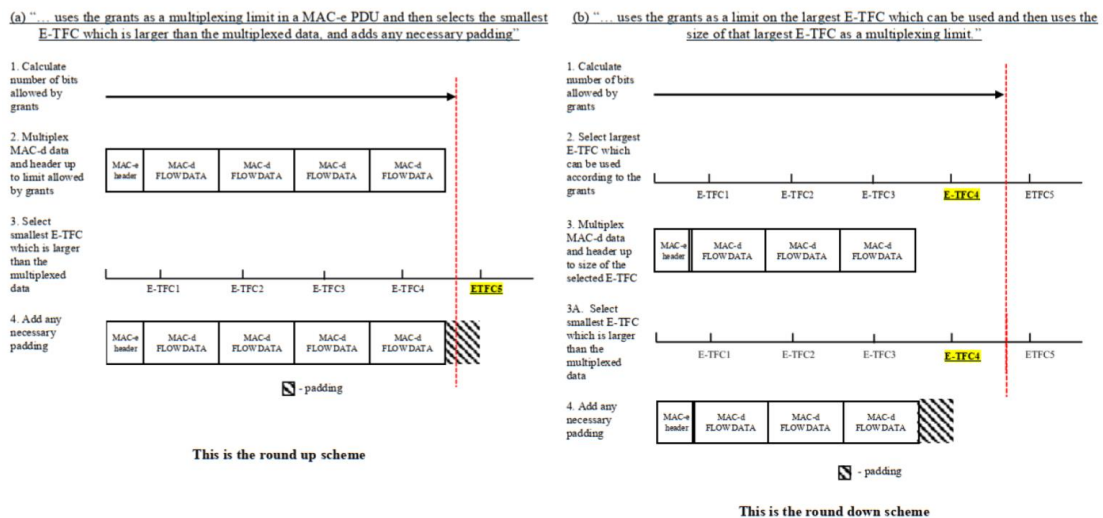
306. It is therefore my understanding that Filiatrault discloses a fundamentally different scheme for MAC-e PDU creation and E-TFC selection compared to the invention claimed in claims 1 and 5 of the Patent.”

40. In his second report Dr Irvine discussed the difference identified by Mr Townend, using Dr Irvine's round down/round up terminology, with the assistance of an illustrative diagram exhibited as JI-3. Dr Irvine agreed with Mr Townend that the claimed invention involved rounding down. Dr Irvine understood Mr Townend's

interpretation of Filiatrault as involving rounding up, but Dr Irvine considered that Filiatrault disclosed rounding down. (As the judge noted, despite having adopted Dr Irvine’s terminology in opening submissions, Lenovo abandoned it in closing.)

41. In cross-examination Dr Irvine accepted that his diagram JI-3 omitted the E-TFC selection step of claims 2 and 6. A corrected version of JI-3 which included this step (as step 3A on the right-hand side) was produced by InterDigital as X3.

Townend 1 paragraph 305



42. The vertical dotted red line represents the amount of data allowed by the grants. In Filiatrault (left-hand side) this is used to determine the number of MAC-d PDUs which can be multiplexed together with a header (step 2). In this example, there are four MAC-d PDUs. Then the smallest E-TFC which is larger than the multiplexed data is selected (step 3). In this example this is E-TFC5 (highlighted in yellow). Padding is then added to fill up the rest of the E-TFC (step 4).
43. In the claimed invention (right-hand side), the grants are used to select the largest E-TFC which is smaller i.e. the “next smaller” E-TFC to adopt Mr Townend’s terminology (step 2). In this example this is E-TFC4 (highlighted in yellow). MAC-d PDUs are then multiplexed together with a header up to the size of the selected E-TFC (step 3). The smallest E-TFC which is larger than the multiplexed data is then selected (step 3A). Finally, padding is added (step 4).
44. The judge noted two points about X3 at [195]:
- “(a) First, on each side E-TFC restriction is assumed to have taken place already and is not illustrated.
- (b) Second, the right-hand side of X3 highlights the additional and earlier selection step, Step 2, which the Patent’s scheme requires. Note this is not E-TFC restriction but a selection from the E-TFCs permitted following E-TFC restriction.”
45. The judge went on at [199]:

“The analysis so far shows that, in order to decide which approach is correct, one can address these questions:

...

- (c) Third, does Filiatrault disclose the additional selection step i.e. step 2 on the right-hand side of X3?”

46. I have omitted the first two questions because they were concerned with issues as to the disclosure of Filiatrault which the judge determined in favour of InterDigital and which are not live on the appeal.

Lenovo’s four cases based on Filiatrault

47. The judge explained at [253] that:

“In its closing arguments, Lenovo contended that claim 1 was invalid over Filiatrault on four different bases, which I will consider in turn:

- (a) First, that Filiatrault clearly and unambiguously taught that the grants (both types) are a limit on uplink resources and therefore Filiatrault anticipates.

...

- (d) Fourth, that if I find in favour of IDC on the ‘means for’ construction issue, that Filiatrault anticipates claim 1 even on Mr Townsend’s reading. This is the case based on DXX/14.”

48. I have omitted the second and third bases because they involved allegations of obviousness which the judge rejected and which Lenovo have not sought to revive. The appeal only concerns the fourth case, but it is important to understand why the judge rejected the first case.

The judge’s rejection of Lenovo’s first case on Filiatrault

49. The judge rejected Lenovo’s first case on Filiatrault for the reasons he summarised at [300]:

“Finally, in case the answers are not already clear, I return to consider the questions I mentioned above [i.e. in paragraph 199]:

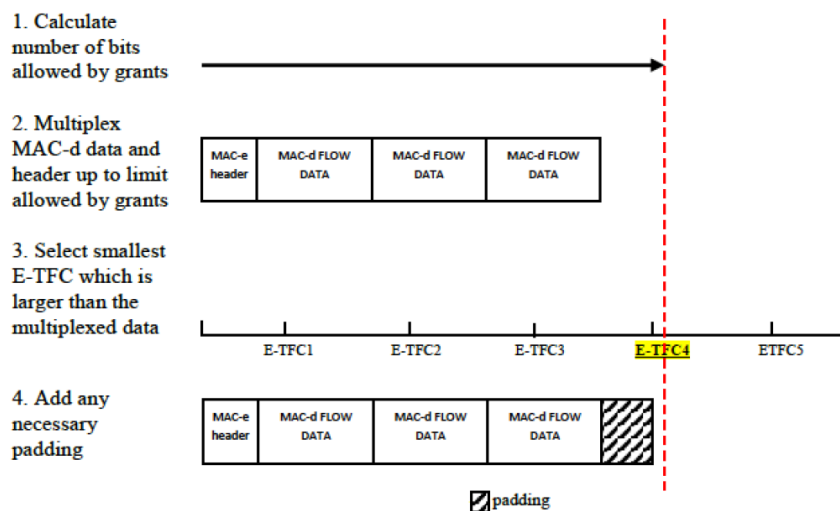
...

- (c) Third, does Filiatrault disclose the additional selection step i.e. step 2 on the right-hand side of X3? Not only does Filiatrault not disclose this additional selection step, but the argument that it did depended on the

skilled person sharing Dr Irvine’s mindset, a point I have firmly rejected.”

DXX/14 and the judge’s reasoning based upon it

50. DXX/14 is an illustrative diagram similar to the left-hand side of JI-3 and X3, showing the effect of Filiatrault where the number of bits allowed by the grants is just slightly larger than the smallest E-TFC which is larger than the multiplexed data, here E-TFC4 (highlighted in yellow). In these circumstances the result is that the multiplexed data is within the limit of the size of the E-TFC although it has not been limited by reference to that size. This is shown below.



51. The judge reasoned as follows:

“316. Shortly before this illustration was put to Mr Townend, he clarified that his paragraph 305(a) was a bit of a shorthand, in that *‘the grants are used, sort of one by one to collectively create that multiplexing limit, as opposed to sort of being used together in the way we were discussing earlier...’* He also made it clear that his paragraph 305 was considering the scenario where the UE is not power-limited, but grant-limited. So his text from paragraph 305(a), quoted in DXX/14, contemplates that the E-TFC restriction step has already taken place. In the illustration therefore, all the illustrated E-TFCs are supported.

317. The cross-examination on DXX/14 went as follows:

‘Q. So in this case, the grants, and again subject to the clarification you made, amount to slightly fewer bits than they did in JI-03. So at Stage 2, adding a fourth MAC PDU would cause the multiplexed data to exceed the grants. You can see that just by eyeballing the page; yes?’

A. Yes, and so I think this is what you were referring to when you were saying ‘subject to the same thing’. So effectively that adding an additional MAC-d PDU would cause one of the grants to be exceeded. It does not much matter which, I suspect.

Q. So in this case, Filiatrault, as you understand it, would produce a MAC PDU as shown here at Stage 4; yes?

A. Yes.

Q. So in this scenario, the UE would limit the amount of MAC-d flow data and associated MAC-e header, to be within the largest E-TFC size that is smaller than the sum of the grants?

A. In this particular case, by virtue of where the MAC-d PDU sizes and the particular grants that were being assumed, yes.

Q. Okay. Thank you. That was just checking that we had understood your evidence correctly, and we obviously have.

A. Yes.’

318. The force of this point is that Mr Townsend accepted that, with certain particular MAC-d PDU sizes and particular grants as illustrated in DXX/14, Filiatrault had means which produced the result required by integer 1F of the Patent.

319. IDC’s only response to this evidence was to brush it aside, saying in their written closing:

‘All this shows is that a phone that does not have the patented means and therefore never applies the patented limit on multiplexing, depending on circumstances in which it is operating (particularly the E-TFC sizes, the multiplexing block size and where the grants fall) may by use of completely different means, applying different multiplexing limits, end up selecting an E-TFC for use that might have been arrived at by a phone using the patented means.’

320. It is true (as I have found above) that Filiatrault does not disclose or teach the solution of the ‘next smaller’ scheme as described in the Patent. However, as I pointed out above, the means required by integer 1F are means which produce a particular result, and the scenario presented in DXX/14 achieves that result.”

52. The judge added a comment at [321]-[322] which is convenient to address below before concluding as follows:

“323. Accordingly, I find that, on the basis of this DXX/14 argument, claim 1 of the Patent is anticipated by Filiatrault.

324. It also follows that if I had construed ‘means for’ as contended for by Lenovo, the Patent would be valid but neither infringed by Lenovo nor essential to the Standard.”

Two points which are not in issue

53. It is important before turning to the issues on the appeal to note two points which were submitted by counsel for InterDigital and accepted by counsel for Lenovo during the course of argument, despite Lenovo having appeared to contest these points in their skeleton argument.

54. First, the judge’s interpretation of integer 1F amounts to treating the word “for” as meaning “adapted for” (rather than “suitable for”, as is normally the case). Furthermore, the judge was correct to interpret the word “for” in that way, because integer 1F is a “means-plus-function” feature carried out by a computer or similar apparatus: see the *Guidelines for Examination in the European Patent Office Part F Chapter IV paragraph 4.13.2*. In this context, therefore, “means for” is to be interpreted as “means programmed to”.

55. Secondly, it is common ground that claims 1 and 2 (which are apparatus claims) have equivalent scope to claims 5 and 6 (which are method claims). It follows that the judge was correct to test the interpretation of claim 1 by reference to claim 5 at [183], and that it is legitimate to apply the same approach to the interpretation adopted by the judge when considering DXX/14.

Paragraphs 1 and 3 of the respondents’ notice

56. It is convenient to address paragraphs 1 and 3 of Lenovo’s respondents’ notice before turning to InterDigital’s appeal. Lenovo contend that “means for limiting MAC-d flow data multiplexed ...” in integer 1F is properly to be interpreted as meaning means for ensuring that the MAC-d flow data multiplexed cannot exceed the stated limit. On that basis, Lenovo say, claim 1 would be valid but not essential or infringed. Lenovo say that the same applies to claim 5. This is the argument which the judge rejected at [181]-[184].

57. Before turning to the merits of this contention, three preliminary points are worth noting. First, as explained below, the contention is deliberately framed by reference to the way in which InterDigital pleaded their case on essentiality and infringement of integers 1F and 5F. Secondly, Lenovo’s primary case on the appeal is that the judge correctly interpreted the claim at [184] and that InterDigital are wrong to suggest that the judge had adopted a different construction when considering DXX/14. Lenovo’s secondary case is that, if the judge erred in his interpretation of the claims, it was in not accepting Lenovo’s construction. Thirdly, although Lenovo appeared to be suggesting in their skeleton argument that the construction of the claims gave rise to a “squeeze” between validity and essentiality/infringement, counsel for Lenovo

accepted that the issues raised by the appeal and by the respondents' notice were separate ones. I shall return to this point below.

58. InterDigital's statement of case on essentiality and infringement relied, in relation to integers 1F and 5F, on paragraph 11.8.1.4 of TS 25.321. It is not necessary to set the paragraph out, save that it begins by saying "if the transmission contains any scheduled data". Having quoted the paragraph, InterDigital pleaded "[t]herefore, the size of the E-TFC cannot exceed the size of the MAC-d flow data allowed by the serving [i.e. scheduled] and non-scheduled grants". It is common ground, however, that, where only non-scheduled data is to be transmitted, the claimed invention is not employed. Thus the claimed method will not be employed in certain TTIs even if it is employed in other TTIs.
59. Lenovo contend that, upon the true construction of integers 1F and 5F, "means for limiting" and "[a method comprising] limiting" require the limit to be of general application and not merely occasional application. The means are not "for limiting", and the method does not comprise "limiting" if the limit can be exceeded. Thus the claims do not cover a device and a method in which the limit can be exceeded.
60. Lenovo submit that this construction is supported by four points. First, the use of the word "limit" in the claims. Lenovo say that something which can be exceeded is simply not a limit. Secondly, the specification of the Patent presents the claimed scheme as a general rule. There is no mention of it only being applied some of the time. Thirdly, Lenovo say that only their construction ensures that an E-TFC larger than the sum of grants is not used and that less padding is used overall. If the claimed scheme need not be of general application, then a larger E-TFC could be used 99 times out of 100. Then more padding would be used even across the cell. Fourthly, Lenovo suggest that the way in which InterDigital pleaded their statement of case indicates that this is how InterDigital read the claims at that time. Moreover, Lenovo point out that InterDigital never amended their statement of case.
61. InterDigital's answers to these points are as follows. First, a limit is still a limit even if it is applied in some TTIs and not others. Secondly, the skilled reader of the Patent would appreciate that, even though it is not expressly stated. Thirdly, InterDigital accept that, if a device is designed only to use the inventive method one time out of 100, then the benefit of the invention will not be obtained. But that just shows that it is possible to infringe the claims badly. The benefit of the invention certainly will be obtained if the method is used 99 times out of 100, yet on Lenovo's construction that would not infringe. Fourthly, InterDigital dispute that their statement of case demonstrates any different understanding of the claim. Rather, the pleading alleges that the limit cannot be exceeded when scheduled data is transmitted, and thus that the claimed method is used in those circumstances.
62. In my judgment the judge was correct to reject Lenovo's construction for the reasons he concisely expressed at [183] and for the additional reasons given by InterDigital. In particular, I agree with the judge that the method claims plainly cover use of the method some of the time even if it is not used at other times, and that it follows that the apparatus claims should be interpreted in the same way.

The appeal

Construction

63. The appeal turns on what the judge meant when he said in [184] that integer 1F “is satisfied by any means which bring about the stated result”. Both sides agree with this statement, but they interpret it differently.
64. InterDigital contend that what integers 1F and 5F require is limiting the multiplexed data to the size of the E-TFC that is next smaller to the size of the data allowed by the total of the scheduled and non-scheduled grants. InterDigital refer to this as identifying (or selecting or choosing) the next smaller E-TFC and using that size as a limit. InterDigital say that this is what the judge meant, and that this is the reason he correctly rejected Lenovo’s first case on Filiatrault. InterDigital contend that the judge fell into error when he came to DXX/14 because, upon analysis, it can be seen that he applied a different interpretation even though he was plainly not intending to do so.
65. Lenovo contend that all the claims require is that the amount of MAC-d flow data which is multiplexed into a MAC-e PDU is limited to a largest E-TFC size that is smaller than a size of MAC-d flow data allowed by the scheduled and non-scheduled grants. Lenovo say that this is what the judge meant, and that this is the reason why he correctly accepted Lenovo’s case based on DXX/14 even though he rejected Lenovo’s first case on Filiatrault. Lenovo say that their first case on Filiatrault was that it disclosed features 1F and 5F on any construction, whereas their fourth case involved applying InterDigital’s own construction of the claims, which the judge accepted, to InterDigital’s own interpretation of Filiatrault. Lenovo also say that, in reality, InterDigital are advancing a new construction on appeal for the first time, which InterDigital should not be permitted to do. Paragraph 2 of Lenovo’s respondents’ notice contends that, if InterDigital are permitted to advance this new construction and if it is accepted, then InterDigital’s essentiality/infringement case must fail; but counsel for Lenovo accepted during the course of argument that it would be difficult for this Court to decide that question.
66. It is convenient to begin with the procedural point raised by Lenovo. As is common ground, the correct interpretation of the claims of a patent is an issue of law for the court to determine. It follows that the court is not bound to accept either party’s construction, either at first instance or upon appeal. It also follows that there is nothing to prevent InterDigital from advancing a different construction in this Court to that which they advanced below, if that is what they are doing, unless that would be procedurally unfair because Lenovo would be prejudiced, in particular by being deprived of the opportunity of adducing evidence which they would otherwise have relied upon.
67. Lenovo rely upon certain passages in InterDigital’s skeleton argument for trial as showing that the construction being advanced by InterDigital was the construction accepted by the judge as interpreted by Lenovo. In my view the passages in question are consistent with the construction advanced by InterDigital in this Court even if they do not positively exclude the judge’s construction as interpreted by Lenovo. Lenovo also rely upon the way in which InterDigital’s essentiality/infringement case was pleaded, as discussed above. That does not assist Lenovo because it does not actually

set out a construction of the claims and it is not inconsistent with InterDigital's construction.

68. InterDigital dispute that they are advancing a new construction. Not only that, but in addition InterDigital contend that the construction they advocate was common ground at trial, subject to the dispute about whether the limit was of general application which I have already addressed. In support of this contention counsel for InterDigital relied upon a passage in Dr Irvine's first report and upon a passage in his cross-examination of Dr Irvine.
69. Before turning to the passages in question, I should make the obvious point that, in general, evidence from expert witnesses as to the meaning of the claims is not admissible on an issue of interpretation. It is nevertheless often appropriate, and indeed necessary, for the experts to set out their understanding of the meaning of the claims, because the opposing side and the court need to know the interpretation upon which the expert's evidence as to issues such as novelty and obvious is premised.
70. In his first report Dr Irvine said at paragraph 8.38:
- “Claim 1 therefore involves three steps:
- 8.38.1 Identify ‘*a size of MAC-d flow data allowed by the serving and non-scheduled grants and available for transmission*’, then
- 8.38.2 Choose the largest E-TFC size that is smaller than this size, then
- 8.38.3 Limit the MAC-d flow data to fit into this E-TFC size.”
71. In cross-examination Dr Irvine said:
- “Q. ... What I was particularly focusing on is that what has been introduced is a new multiplexing limit, and in identifying the multiplexing limit, determining it, what we use is an E-TFC which has been derived from a volume, which is the sum of the grants, and going to the next smallest E-TFC?
- A. Yes.
- Q. That is what is in the claim?
- A. I would agree with that, yes.”
72. Counsel for Lenovo submitted that this evidence was not given with the present issue in mind. I cannot accept that submission. Dr Irvine's evidence in his first report was given in support of Lenovo's case on anticipation by Filiatrault, as well as their case on non-essentiality, and therefore was necessarily premised upon a particular interpretation of the claim. Certainly, by the time Dr Irvine was being cross-examined, the battle lines between the parties had been clearly drawn.
73. I accept counsel for InterDigital's submission that Dr Irvine's evidence is consistent with InterDigital's present construction of the claims. It follows that the construction

is not a new one, and Lenovo cannot be prejudiced by it being advanced now. It does not necessarily follow that InterDigital's construction is correct, however. Nor does it necessarily follow that the judge applied a different construction when considering DXX/14.

74. I turn next to the merits of the rival constructions as presented to this Court. Given that it is common ground that “for” in integer 1F means “adapted for” or “programmed to”, and that claims 1 and 5 have equivalent scope, it is important not to be distracted by the fact that integer 1F begins with the words “means for”. The key words of integers 1F and 5F are as follows:

“limiting MAC-d flow data multiplexed into a MAC-e PDU to a largest E-TFC size that is smaller than a size of MAC-d flow data allowed by the received serving and non-scheduled grants ...”.

75. Lenovo contend that InterDigital's construction cannot be correct for five reasons. First, Lenovo say that InterDigital's construction amounts to writing words into the claim which are not present, namely words along the lines “selecting the next smaller E-TFC and using its size as a limit to multiplexing of data”.
76. Secondly, Lenovo say that it makes sense for the claims to be drafted towards a result, rather than a procedure carried out within a mobile device, because the standard generally specifies only the results to be achieved and not matters of implementation.
77. Thirdly, Lenovo say that InterDigital could have drafted a claim which included the words they now seek to write into the claim, but did not, no doubt because such a claim would not have been essential and therefore would have been of little commercial value.
78. Fourthly, Lenovo rely upon the fact that the invention is directed to what is sent over the air: its purpose is to reduce padding, and in particular to ensure that an E-TFC larger than the sum of grants is not used. Lenovo argue that the skilled reader would not think that the patentee intended to limit the claims to any particular procedure within the mobile device. Rather, they would understand that the claim was intended to embrace any means or method which is able to produce the result that no E-TFC larger than the sum of the grants is used.
79. Fifthly, Lenovo rely upon the fact that the specification discloses a variety of specific methods which limit the amount of data which is multiplexed. Lenovo argue that it is significant that the claims are not limited to any specific method.
80. InterDigital's answers to these arguments are as follows. First, InterDigital dispute that their construction involves writing words into the claim. Rather, it is the meaning of the words which have actually been used. Secondly, InterDigital agree that the standard is not concerned with implementation details, but argue that this is beside the point. The invention is a method, and means adapted for implementing that method. Thirdly, InterDigital dispute that this issue is relevant to essentiality/infringement for the reasons discussed below. Fourthly, InterDigital say that it cannot be correct to interpret the claim in a manner which does not achieve the inventor's purpose. Fifthly, InterDigital accept that the specification discloses more specific embodiments of the invention, but contend that their interpretation is consistent with the level of

generality at which the claim is expressed. That level of generality requires the E-TFC size to be used as a limit, but not in any particular way.

81. I find InterDigital's arguments persuasive. As always, the three key considerations are, first, the wording of the relevant integer of the claim, secondly, the context provided by the specification, and thirdly, the inventor's purpose.
82. So far as the wording of the claim is concerned, this requires "*limiting* MAC-d data ... to a largest *E-TFC size* that is smaller than a size of MAC-d data allowed by ... the grants [emphases added]". It seems to me that this requires the next smaller E-TFC to be identified (or selected or chosen) and used to limit the MAC-d data. It is not sufficient that, at the end of a process, the MAC-d data happens to fit within the next smaller E-TFC.
83. This interpretation is supported by the passages in the specification at [0025]-[0026] (as explained by the judge at [127]-[128]) and [0028]-[0029] (particularly the sentence in [0028] emphasised by the judge).
84. As for the inventor's purpose, it is vital to *ensure* that an E-TFC larger than the sum of grants is not used in order to avoid excess padding overall. This is not ensured if it depends on whether the relative sizes of the sum of the grants and the MAC-d data flows mean that the latter happen to fit within the next smaller E-TFC. On the contrary, the result could also be that the padding is equal to or exceeds the MAC-d block size.
85. I therefore conclude that InterDigital's construction is the correct one. It remains to consider whether, so construed, the claims are (i) essential and infringed and (ii) novel over Filiatrault.

Essentiality and infringement

86. My conclusion as to construction does not affect the judge's decision that the claims are essential and infringed. The only relevant non-essentiality and non-infringement issue before the judge was the temporal issue I have considered in the context of paragraphs 1 and 3 of Lenovo's respondents' notice. Counsel for Lenovo submitted that the judge had not decided whether the claims were essential and infringed on the construction advanced by InterDigital in this Court. I disagree. So far as is material to essentiality/infringement there is no difference between the judge's construction and the construction I have adopted.

Novelty

87. The judge rejected Lenovo's first case because Filiatrault did not disclose step 2 on the right-hand side of X3, that is to say, it did not disclose selecting the next smaller E-TFC for use as a multiplexing limit. He nevertheless held the claims lacked novelty over Filiatrault because DXX/14 showed that, with certain MAC-d PDU sizes and grants, Filiatrault produced the result required by integer 1F.
88. In my judgment the judge was mistaken about this. It appears that he was beguiled by a sleight of hand in the cross-examination of Mr Townend. As counsel for InterDigital pointed out, the key question was whether "the UE would limit the amount of MAC-d

flow data and associated MAC-e header, to be *within* the largest E-TFC size that is smaller than the sum of the grants [emphasis added].” Mr Townsend said yes, “by virtue of the ... MAC-d PDU sizes and the particular grants that were being assumed”. Mr Townsend was not asked whether the *next smaller E-TFC was used to limit* the multiplexing of the MAC-d data. If he had been asked, it is clear that he would have answered no. As Mr Townsend explained in his paragraph 305(b), “[t]he claimed invention ... uses the size of that [next smaller] E-TFC as a multiplexing limit”. Moreover, as can be seen from [195(b)], [199(c)], and [300(c)], the judge accepted this, which is why he rejected Lenovo’s first case on Filiatrault.

89. Counsel for Lenovo argued that the judge was correct because, as the judge explained at [316], the process illustrated in DXX/14 took place after E-TFC restriction (which is feature 1E and 5E in the claims), and therefore the process was one which involved limiting. Moreover, the limit was that required by integers 1F and 5F. I do not accept this. As the judge explained at [195], E-TFC restriction is assumed to have taken place prior to X3, and the issue was whether Filiatrault had the E-TFC selection step required by the claims. The purpose of that step is to use the selected E-TFC as the multiplexing limit, rather than using the grants as in Filiatrault. The issue is the same with DXX/14.
90. In addition, the judge omitted to carry out the cross-check by reference to claim 5 which he had carried out in [183]. If he had asked himself whether DXX/14 showed that Filiatrault disclosed a method for limiting etc, rather than focussing on the end result of the process, I think he would have reached a different conclusion.
91. Finally, the judge may have thought that there was a squeeze between novelty and essentiality/infringement here; but if so, this is not the case. As explained above, the issue on essentiality/infringement is the temporal issue. The issue on novelty is a different one.
92. I would add that the conclusion I have arrived at is supported by three other considerations, two of which the judge himself mentioned in his judgment. First, Lenovo’s case on Filiatrault evolved over time, and DXX/14 emerged very late. As the judge recognised, this is a pointer against anticipation although it is not determinative.
93. Secondly, the judge commented at [321] that Lenovo’s argument had struck him as akin to the argument rejected by Graham J and the Court of Appeal in *Hickman v Andrews* [1983] RPC 147 when a prior art bookbinder’s press was alleged to anticipate a patent for a workbench. The judge cited what Graham J said at 168:

“I think one must be realistic about these things when construed in a patent specification and must avoid, if one can, falling into the trap of being astute after the event by *ex post facto* synthesis to build up an anticipation out of a prior document or prior user in order to make it fit the claim.”
94. The judge nevertheless concluded at [322] that anticipation was the inexorable result of the construction of the claim he had adopted. In my view the judge’s instinct about Lenovo’s argument was well-founded. His only error was in failing to identify the sleight of hand that it involved. As I indicated at the outset, this is understandable in

circumstances where the DXX/14 point was a small issue among many the judge had to deal with.

95. Thirdly, it is a general principle that the skilled person would not expect the claim to cover prior art acknowledged in the specification, and thus the court should lean against a construction which has that effect: see *Virgin Airways Ltd v Premium Aircraft Interiors UK Ltd* [2009] EWCA Civ 1062, [2010] RPC 8 at [13] (Jacob LJ). Although Filiatrault is not in terms acknowledged in the Patent, it was common ground between the experts that the earlier part of the specification was based upon it (or an earlier draft of v6.2.0 which was not materially different). Moreover, it is clear that the skilled reader would appreciate that. Accordingly, I think this principle is applicable here.

Conclusion

96. For the reasons given above I would allow the appeal.

Lady Justice Asplin:

97. I agree.

Lord Justice Lewison:

98. I also agree.