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Case No: A3/2019/1781

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)

The Hon Mr Justice Arnold
[2019] EWHC 1687 (Pat)

Royal Courts of Justice
Strand, London, WC2A 2LL

Date: 08/10/2020

Before :

LORD JUSTICE PATTEN
LORD JUSTICE FLOYD
and
LORD JUSTICE NEWEY

Between :

CONVERSANT WIRELESS LICENSING SARL **Appellant**
- and -
(1) HUAWEI TECHNOLOGIES CO., LIMITED
(2) HUAWEI TECHNOLOGIES (UK) CO., LIMITED
(3) ZTE CORPORATION
(4) ZTE (UK) LIMITED **Respondents**

Adrian Speck QC, Mark Chacksfield QC and Michael Conway (instructed by **EIP Legal**)
for the Appellant
Iain Purvis QC and Miles Copeland (instructed by **Allen & Overy LLP**) for the **First and**
Second Respondents
Iain Purvis QC and Miles Copeland (instructed and by **Bristows**) for the **Third and Fourth**
Respondents

Hearing dates: 23 and 24 June 2020

Approved Judgment

Lord Justice Floyd:

1. The issue in this appeal is whether European Patent (UK) No 1 797 659 entitled “Slow MAC-e for autonomous transmission in high speed uplink packet access (HSUPA) along with service specific transmission time control” (“the patent”) is invalid on the ground known as “added matter”. By an order sealed on 8 November 2019 Arnold J (as he was then) decided that it was invalid on that ground, and accordingly revoked the patent. Conversant, the proprietor of the patent, appeals with permission granted by the judge. The judge had to decide a very large number of other issues related to the patent, some of which were originally the subject of a respondent’s notice, but all those issues have now fallen away.
2. In essence, the added matter objection arises out of amendments that were made to the claims, partly in the course of the prosecution of the patent and partly in the litigation. No change was made to the technical disclosure in the body of the specification. Thus, if there was added matter, it was because the amendments to the claim, when considered as a whole, used language which disclosed something further about the invention. Before one can get to the nub of what is a very narrow issue, it is necessary to explain something about the technical concepts involved in the invention. This area of technology is more than usually plagued with acronyms, and so I include a glossary as an appendix to this judgment.

Technical background

3. The patent is written against the background of the Universal Mobile Telecommunications Standard (“UMTS”). The UMTS network connects multiple mobile telephones (called “User Equipments” or “UEs”) in a given area or cell to a mobile telephony mast or base station (called a “Node B”). The Node B together with the Radio Network Controller (“RNC”) form the Radio Access Network (“RAN”). The RAN handles the transmissions between the mobile phones and the Core Network, which manages and processes transmissions across the network and interfaces with external networks such as the internet.
4. The Node B needs to be able to distinguish between the transmissions of different UEs. There are a variety of different ways of doing this, but UMTS uses Code Division Multiple Access (“CDMA”). In CDMA, the different UE transmissions are sent at the same time and on the same frequency, but can be distinguished on the basis of codes. One consequence of the use of CDMA is that, from the perspective of one signal received from a UE at the Node B, the signals of other users are perceived as unwanted noise. The noise level is dependent not only on the number of other UEs sending signals, but on the volume of data in their signals: the higher the volume of data, the greater the power of the signal, and hence the greater the noise. Rise over Thermal (“RoT”) is a measure of the interference within the cell and indicates the ratio between the total interference received at a Node B and the background (thermal) noise.
5. The system therefore needs to have a way of controlling the overall level of noise in a cell, by controlling the power used by each UE. The aim is to operate the cell close to its maximum planned load, without overloading. This is achieved in part by the scheduling of transmissions by the Node B. Scheduled transmissions are not the only type of transmission, however. There are also non-scheduled, or autonomous,

transmissions. The Node B must estimate the power usage of these non-scheduled transmissions which are not under its control. That estimate will be a function of the number of UEs in the cell. Subtracting the estimate for these unscheduled transmissions from the maximum planned load tells the Node B what budget is left for scheduled transmissions. Decreasing this estimate would allow the Node B to increase the budget for scheduled transmissions and improve the overall efficiency of the system. The problem with having too large an estimate for non-scheduled transmissions is that some of the power reserved may turn out not to be necessary.

6. A simple analogy might be a train operation which reserves a number of seats for pre-booked ticket holders but holds some seats back for spontaneous travellers. If too many seats are held back for spontaneous travellers the service is less efficient as it risks running with empty seats. If not enough are held back, spontaneous travellers will not be accommodated on the first service to leave.
7. Returning to UMTS, the data transmitted requires a scheduled or non-scheduled “grant”. Scheduled transmissions are in general not delay sensitive and include such matters as uploading data. Non-scheduled transmissions are delay sensitive. An example would be a telephone connection using the Voice over Internet Protocol (“VOIP”), or the sending of control data. Only non-scheduled data may use the non-scheduled grant, and only scheduled data can use the scheduled grant.
8. A further concept referred to in the patent is the “minimum set”. At the earliest priority date of the patent it was proposed that the minimum set could provide a means of ensuring that data could always be transmitted without a grant from the Node B. The minimum set defines a set of transport format combinations whose use is always supported irrespective of the limitations of the power headroom.
9. The Open Systems International (“OSI”) model is a conceptual model used to explain functional layers in a communications network. The layers are referred to as a stack. On the transmission side, each layer transmits data on behalf of the layer above and in turn relies on the layer below to transmit its output. The data packets which arrive from the layer above are called Service Data Units (“SDUs”). Once a SDU has been processed by a layer, it is passed to the layer below as a Protocol Data Unit (“PDU”). The PDU sent to the layer below will be the lower layer’s SDU, and so on.
10. Each layer in the stack on the transmission side is considered to communicate via a logical link with a corresponding layer in the receiver. Only the physical layer, layer 1 or PHY, actually transmits data over the air interface, however. This is the bottom layer of the stack. The passing of data between layers within the stack is also referred to as “transmitting”, even though it does not equate to transmission over the air. On the receiver side the stack is mirrored, and the data is passed up through a matching stack of layers, performing the processes in reverse.
11. Layer 2 is the data link layer, which is responsible for ensuring that there is a reliable flow of data across the communications link. It consists of three sub-layers. In order ascending through the stack these are the Medium Access Control sub-layer (“MAC”), the Radio Link Control (“RLC”) and one further sub-layer. Data is buffered in the RLC. That means that PDUs are assembled in the RLC and wait in a buffer to be taken by the MAC.

12. A further refinement is that the MAC layer is made up of several entities. The introduction of HSUPA (see paragraph 1 above) came with a new dedicated uplink channel called the Enhanced Dedicated Channel (“E-DCH”). This necessitated some changes in the architecture of the MAC. Prior to the introduction of this new channel, the MAC processing for dedicated traffic was performed by a component called MAC-d (“d” for dedicated). The change was the introduction of MAC-e and MAC-es components (“e” for enhanced). As the judge explained, in the UE the MAC-e/es component sits below MAC-d and is fed by it. MAC-es receives PDUs from particular logical channels directly from MAC-d and combines them into MAC-es PDUs. Several of these MAC-es PDUs may be combined into a single MAC-e PDU.
13. The Transmission Time Interval (“TTI”) is the duration of time over which the physical layer may transmit a transport block over the air. It has a strictly defined start and end point and a fixed duration. The processing steps conducted by each layer on data to be transmitted over the air interface during a given TTI cannot of course be carried out simultaneously. Thus, when discussing a TTI, one is discussing the period of time in relation to which the particular layer is performing the necessary processing on the data which will ultimately be sent over the air in that TTI. A TTI in different layers cannot be equated with a particular moment in time. The rapid dynamic scheduling under the control of the Node B is carried out on a TTI by TTI basis.
14. It is also necessary to explain some basic features of Hybrid Automated Repeat Request (“HARQ”). HARQ allows data to be re-transmitted when it is not correctly received by the Node B. Each MAC-e PDU is assigned to a specific HARQ process (of which there are 8 for a 2 ms TTI) which handles the transmission and re-transmission of the MAC-e PDU associated with it. It follows that the UE and Node B “know” which HARQ process is available to be used in a given TTI, avoiding the need for the transmission of overhead to provide this information. This is known as “synchronous HARQ”. If a transmission on the uplink is not acknowledged as received, then the UE will repeat the transmission, but will only do so in a MAC-e PDU assigned to the same HARQ process. The data is thus held up in a HARQ buffer until a PDU with the correct HARQ process assigned to it becomes available, whereupon the data is sent again. There is a limit on the number of re-transmissions which can be attempted before the data is discarded. Until that point is reached, or the data is successfully sent, the particular HARQ process remains blocked and reserved for the re-transmission attempts.
15. Data from both the scheduled and non-scheduled categories may be combined into a single MAC-e PDU. This was explained by the judge by reference to a worked example illustrated by Conversant’s expert witness Prof Marshall:

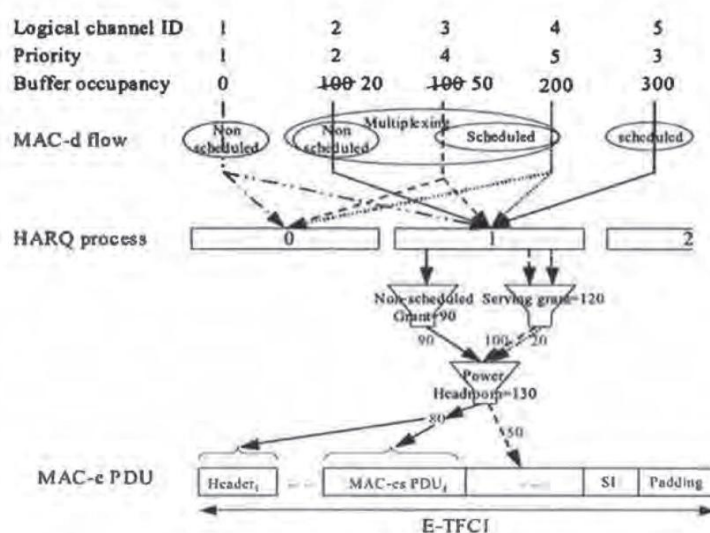


Figure 12 - Worked example of bit mapping for E-TFC selection (Reproduced from L. Hanzo, J.S. Blough, S. Ni (2008) "3G, HSPA and FDD vs TDD Networking" ISBN 978-0-470-75420-7 (HB) Chapter 2, Section 2.3.2.

16. In this example there are five logical channels with IDs 1 to 5 (see the first line at the top of the figure). Logical channels with ID 1 and ID 2 are non-scheduled channels and logical channels IDs 3 to 5 are scheduled channels (see the fourth line). In the example, the multiplexing rules allow multiplexing of channels with IDs 2, 3 and 4, but not 1 and 5 (shown by the ellipses in the fourth line). Each channel has been assigned a priority (see the second line): a priority of 1 is the highest priority (in this case channel ID 1 and ID 2 have higher priority than channels IDs 3-5 consistent with being non-scheduled, delay sensitive data). Each channel is assumed to have an amount of data in the buffer (shown in the third line).
17. The diagram shows a transmission for HARQ process 1 (see the fifth line). As logical channel ID 1 has the highest priority its buffer occupancy is checked first. Its buffer occupancy is shown as zero, causing selection to move on to the channel with the next highest priority, channel ID 2, which initially has 100 bits in its buffer.
18. In the example, the non-scheduled grant allows 90 non-scheduled bits to be transmitted and the scheduled (or "serving") grant allows 120 bits. This is shown adjacent to the small "hopper" icons in the diagram. Logical channel ID 2 is thus assigned all 90 bits available for non-scheduled data.
19. The multiplexing rules mean that the only other data which can be considered for inclusion is that in channel IDs 3 and 4. These are both scheduled channels, subject to the scheduled grant of 120 bits. Channel ID 3 has the higher priority and so all 100 bits in its buffer are selected, leaving only 20 bits (out of 200) for channel ID 4.
20. At this point one has selected 90 bits from channel ID 2 and 120 bits from channel IDs 3 and 4 making a total of 210 bits. The power headroom, however (as shown in the third hopper in the diagram) is only 130 bits. This necessitates a further process to fit the data into the available capacity. This accounts for the corrected figures in the buffer occupancy being reduced by 80 (instead of 90) for channel ID 2, 50 (instead of 100) for channel ID 3, and 0 (instead of 20) for channel ID 4. The overall reduction

in bits in the buffers is then 130, consistently with the power headroom. Thus, in the bottom line of the diagram one sees 130 bits being loaded into a MAC-es PDU, consisting of 80 non-scheduled and 50 scheduled bits, coming from their separate respective MAC-d flows.

21. This example has some importance for the added matter arguments to which I will come.

The patent

22. The title of the patent, which I have set out in paragraph 1 above, mentions two separate aspects of the invention, but the appeal is concerned only with the first, i.e. slow MAC-e for autonomous transmission in HSUPA. The patent is based on the idea that, even though one is dealing with non-scheduled data which is time-sensitive, it is advantageous to *slow down* the regularity with which blocks of that data are sent so as to allow the blocks of data that would otherwise be sent separately to be collated into bigger, less frequent blocks. This has two advantages. First, it reduces the amount of control overhead which must be sent. Secondly, by reducing the amount of time that the individual phones may send data outside the control of the Node B, the extent to which it has to allocate some of the overall power budget to non-scheduled transmissions is reduced.

23. The patent explains at paragraph [0004] that the potential for a number of UEs to perform unscheduled autonomous transmissions may require the reservation of a margin (called the Rise over Thermal or RoT margin) for these UEs. With a large number of UEs, the required RoT margin may become significant, which would then degrade the performance of scheduled transmissions. Paragraph [0009] explains the point about control data:

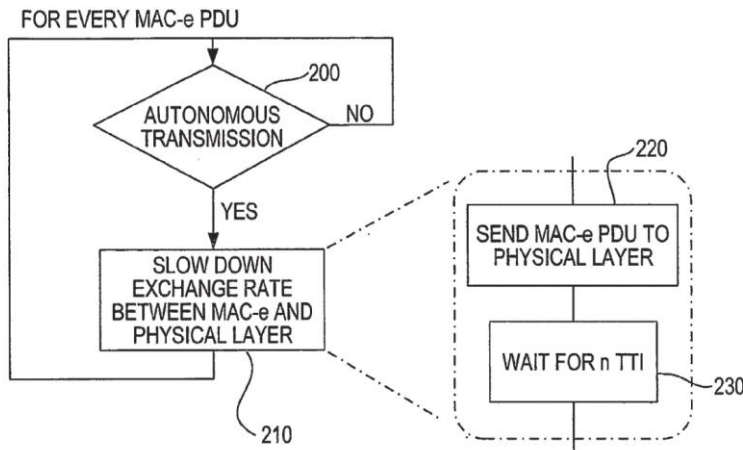
“It is possible to reduce the control overhead by transmitting more packets in the same transport block but less often. However, the payload in the [transport block] and the TTI would be increased”

24. To return to my crude train analogy, the operator reduces the number of seats available to spontaneous travellers allowing it to increase the number of seats for pre-booked passengers. This is achieved by making the spontaneous travellers hold back at the station so that the space allocated for them can be filled without wasting capacity.

25. The Summary of the Invention begins at [0013] and at [0014] the patent says this:

“In accordance with the invention, a control parameter that is independent from an air interface transmission time interval (TTI), hybrid automatic repeat transmission (HARQ) processes or enhanced dedicated transport channel (E-DCH) scheduling is used. This control defines the minimum time interval between subsequent new transmissions. The control has no impact on re-transmissions, which are performed normally.”

26. As the judge observed at [78] of his judgment, the specification distinguishes between new transmissions and re-transmissions. As explained by reference to Figures 3 and 5 (see below) the skilled person would understand that re-transmission may affect the timing of new transmissions. The idea of a minimum time interval between transmissions introduced by the patent is therefore subject to that effect.
27. The specification then goes on to describe, at [0015] to [0019], a number of approaches involving the application of this concept, which are subsequently explained in more detail by reference to the diagrams. The approach described at [0015] is that, for every MAC-e PDU, the UE checks for autonomous transmissions. If the transmission is not autonomous, the check is continually performed until an autonomous transmission is detected. In that event it slows down the exchange rate between the MAC-e and the PHY. MAC-e PDUs are sent to the PHY once every “n” TTIs instead of once every TTI (where n is a control parameter). In an alternative discussed at [0016] the patent says that the rate at which the MAC-e sends PDUs to the PHY using transport formats belonging to the minimum set is decelerated so as to reduce the impact of the minimum set over RoT. The specification goes on to say at [0017] that, as the value of the parameter n is increased, the effective bit rate of the autonomous transmissions is reduced.
28. At [0018] the patent explains an approach in which a new parameter, an SDU inter-arrival rate, establishes the minimum time interval between consecutive SDUs transmitted on a specific “RAB”. RAB stands for radio access bearer. It is explained that the application does not deliver SDUs to the MAC layer at a higher rate than that specified by the parameter. If the data source produces several packets in this time interval, the packets are grouped together in a single SDU. As the judge explained at [85], the skilled reader would understand that RLC SDUs are slowed down somewhere above the MAC layer, thereby affecting the flow of MAC-e PDUs into the PHY. Grouping the packets in the MAC layer enables efficient sharing of the uplink power resources.
29. At [0019] the specification explains another alternative, in which a new MAC parameter known as a “virtual TTI” or “vTTI” is introduced in the MAC-d layer. The virtual TTI defines the minimum time interval between subsequent new transmissions for a MAC-d flow. A first transmission would be permitted only once during the virtual TTI. The vTTI parameter, as the judge found at [0087], has no effect on re-transmissions, which occur normally. Further, although the description refers to “a MAC-d flow” the skilled person would understand, for technical reasons, that the language was equally apt to cover a situation in which multiple MAC-d flows are affected.
30. Paragraph [0032] of the patent explains the essence of the approach at [0015]. This is illustrated in Figure 2:



31. Paragraphs [0035] to [0038] describe the embodiment of paragraph [0018] in more detail by reference to Figures 3 and 4. These figures show the effect of the introduction of the SDU inter-arrival rate parameter, specified at 40 ms. It is sufficient to consider Figure 3 which uses a 10 ms TTI :

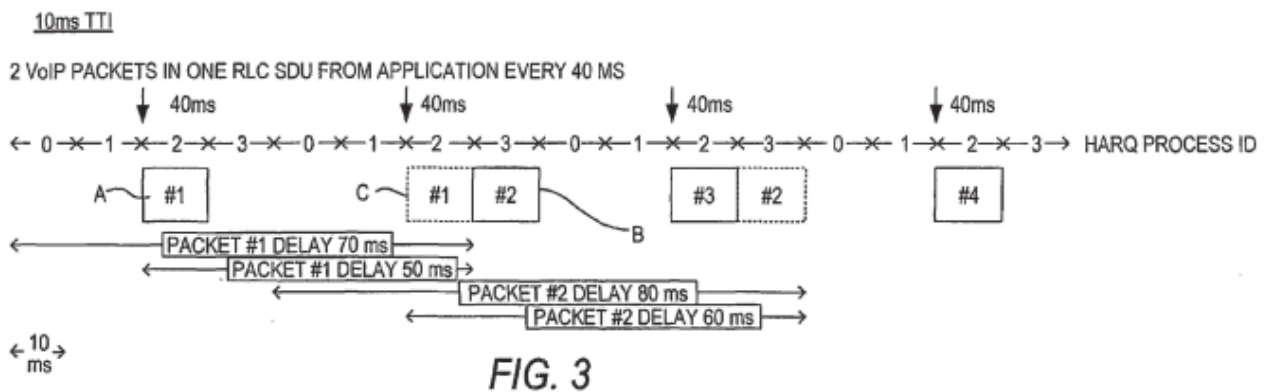


FIG. 3

32. The example of Figure 3 illustrates how VOIP packets, which are an example of delay-sensitive data, are affected by HARQ re-transmissions. Two VOIP packets are contained in one RLC SDU (see the first line of Figure 3). The vertical arrows in the third line mark out the 40 ms SDU inter-arrival rate. The MAC-e PDUs containing RLC SDUs #1 and #2 are the subject of HARQ re-transmissions. The MAC-e PDU containing RLC SDU #1 (shown by the letter A) is transmitted in HARQ process number 2 (to which it will be tied for its re-transmission). It must therefore be transmitted again, but the SDU inter-arrival rate of 40 ms means that re-transmission must wait for 40 ms. RLC SDU #1 is shown being re-transmitted (in the correct HARQ process 2) 40 ms later, as shown by the letter C and dotted outline. At this point a further RLC SDU, RLC SDU #2, is available for transmission, but it cannot be transmitted in the first TTI of the next SDU inter-arrival interval because of the re-transmission of the MAC-e PDU containing RLC SDU #1. It is therefore transmitted in the next TTI, 10 ms later, and in HARQ process 3 (as shown by letter B).

33. In the next SDU inter-arrival interval, RLC SDU #3 is available for transmission. It can be sent in the first TTI because HARQ process 2 is now free. The re-transmission of the MAC-e PDU containing RLC SDU #2 can be transmitted in its correct HARQ process 3. In the final SDU inter-arrival rate interval the MAC-e PDU containing RLC SDU #4 can be sent in the first TTI, because no TTI is reserved for re-transmissions.
34. The effect of all this is shown as a series of packet delays on Figure 3. The first two lines show the delay for the two VOIP packets in RLC SDU #1, whilst the third and fourth lines show the delay for the two VOIP packets in RLC SDU #2. For the RLC SDU #1 the delays are 70 and 50 ms. For RLC SDU #2 the delays are 60 and 80 ms. The extra 10 ms delay for the VOIP packets in RLC SDU #2 is due to the re-transmission of RLC SDU #1.
35. The embodiment alluded to in paragraph [0019] of the patent is explained by reference to Figure 5 and 6 in paragraphs [0038] and following. Figure 5 shows the use of a vTTI of 40 ms on VOIP packets transmitted every 20 ms:

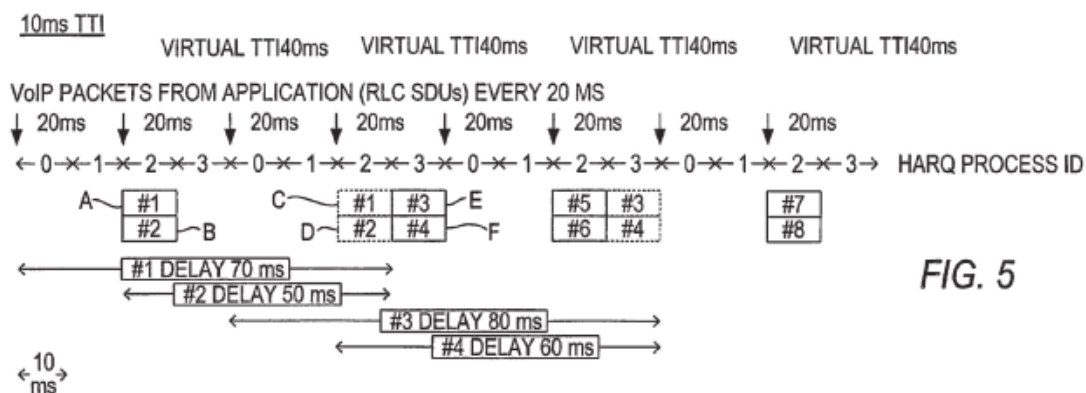


FIG. 5

36. In this alternative, the grouping of RLC SDUs, each of which contains a single VOIP packet, occurs at the MAC-d layer. RLC SDUs are delivered to the MAC-d every 20 ms, as shown by the vertical arrows. The imposition of the vTTI means that a first transmission of data (as opposed to a re-transmission) can occur only once in a vTTI.
37. Packets #1 and #2 can be fitted into a single MAC-e PDU. This MAC-e PDU is shown being sent on HARQ process 2 by letters A and B in the same TTI. Packets #3 and #4 are grouped together for transmission in the same TTI, but this cannot occur in the same vTTI. They also cannot be transmitted in the first 10 ms of the next vTTI, because that is blocked by the re-transmission of packets #1 and #2 (as shown by dotted outlines and letters C and D). They are sent in the next TTI (on HARQ process 3) as shown by letters E and F. Packets #5 and #6 can be transmitted at the beginning of the next vTTI, which is not blocked by a re-transmission, and the re-transmission of packets #3 and #4 can occur in the next TTI on the correct HARQ process 3.
38. The packet delays are again shown at the bottom of the figure. They are the same as for Figure 3.

39. The next part of the specification to consider is at [0050] to [0052] and is central to the dispute between the parties on this appeal. It is said to provide the basis for the parts of the claim which are objected to on the grounds of added matter. I first set out paragraph [0050] split into two parts, as the judge did, for clarity:

"In accordance with the present contemplated embodiments, the UE power limitations in bad radio conditions, such as the UE running out of transmission power, are taken into account so that it then becomes possible to send a single speech packet per air interface TTI of 2 ms or 10 ms. Here, the MAC-d would check the RLC buffer of the UE once per virtual TTI, i.e., at the same interval as a normal TTI As a result, packets received during the virtual TTI would be buffered at the RLC level.

In addition, the MAC is permitted to check the RLC buffer more frequently in certain special cases, such as when it is not possible to clear the RLC buffer due to power limitations, the transmission of higher priority packets from other RLC buffer[s] (e.g. SRB) or if there are bigger RLC SDUs (e.g., non-compressed headers or real time control protocol (RTCP) packets) that cannot be transmitted within one air interface TTI."

40. As the judge explained, the first half of the paragraph is saying that the MAC could check the RLC buffer once every vTTI in the same way as the MAC would normally check the buffer once every normal (air interface) TTI. It goes on to say that packets received during the vTTI have to be buffered in the RLC buffer. The skilled person would understand that the packets so buffered would be stored until they could be transmitted in the next vTTI.
41. The second half of the paragraph states that in some special cases the MAC is permitted to check the RLC buffer more frequently than once per vTTI. The skilled person would, the judge held, understand this to mean that in those circumstances the MAC is able to transmit during more than one TTI every vTTI.
42. The special cases identified where the MAC is permitted to check more frequently than once per vTTI are (a) where it is not possible to clear the buffer due to power limitations; (b) where there is transmission of higher priority packets from other RLC buffers; or (c) if there are bigger RLC SDUs that cannot be transmitted within one TTI.
43. I can pass lightly over paragraph [0051] and its reference to Figure 7. There was a vigorous debate at trial about the consistency of Figure 7 with the text of [0051], but neither side placed any emphasis on [0051] in this appeal. The judge held at [139] of his judgment that this debate did not undermine "the clear teaching of [0052]".
44. The material part of [0052] of the specification, reads as follows:

"Examples of the operation of the UE MAC under such conditions are as follows: (i) if the MAC is able to empty the RLC buffer during this air interface TTI, then the MAC will

check the RLC buffer at the next predetermined subsequent time interval after the virtual TTI; (ii) if the MAC is not able to empty the buffer, then the MAC will also check the RLC buffer for the next air interface TTI. This permits rapid clearing of the RLC buffers when required, i.e., when large SDUs are utilized. However, the frequency of transmissions during normal operation remains limited.”

45. There was a dispute at trial about what this passage was disclosing. The judge dealt with this at [142] to [145] of his judgment. He appears to have accepted Conversant’s interpretation. That interpretation was that (i) if the MAC is able to empty the RLC buffer in a particular TTI it will stop transmitting and wait until the next vTTI before transmitting again and (ii) if the MAC is not able to empty the RLC buffer in that TTI then it will check the RLC buffer in the next TTI and transmit the excess data in that TTI. It was implicit that it would continue to do this until the RLC buffer was empty. This is what permitted rapid clearing of RLC buffers.

The claims

46. As sought to be amended during the litigation (shown by underlining) and broken down into integers (as the judge did), claim 1 is to:

"[A] A method which is executed by a mobile station for autonomous enhanced uplink transmission in which a scheduling grant from a network is not required, comprising:

[B] determining a virtual transmission time interval for a medium access control entity, which virtual transmission time interval defines a minimum time interval that is allowed between enhanced uplink transmissions;

[C] checking to determine whether the medium access control entity is transmitting data packets in a current air interface transmission time interval, by checking whether the medium access control entity is able to empty the radio link control buffer in the current air interface transmission time interval;

[D] and for the case where it is determined that the medium access control entity is not transmitting in the current air interface transmission time interval, transmitting a next data packet only after a period determined by the virtual transmission time interval is determined to have elapsed."

The added matter objection

47. The added matter objection focuses on integer [C], although it is necessary to consider integer [D] as well. Integer [D] spells out the consequences of the checks which are required by integer [C]. It will be seen that integer [C] refers to two checks. I will refer to these checks as “the transmitting check” and “the able-to-empty check”. The checks are, however, linked. The import of the claim is that the able-to-empty check is a way of performing a transmitting check. Huawei and ZTE submit that the claim

discloses, whereas the application as filed did not disclose, a transmitting check. They contend that it follows that, whilst the application did disclose an able-to-empty check, it did not disclose a link between that check and a transmitting check.

48. The opening words of integer [C] were added to the claim during prosecution of the patent before the European Patent Office. Conversant explains that the amendment was sought because of a fear that those opening words might be regarded as an impermissible generalisation of a concept that was only explained in the specification by reference to the able-to-empty check. By seeking to add the words underlined to integer [C] Conversant was simply restoring the disclosure to that which the skilled person would take from the description at paragraphs [50] to [52] of the specification.
49. By a letter dated 7 May 2019 to Conversant the Comptroller expressed the view that the amendments were not allowable because they added matter. The relevant part of the letter, having set out the text of what became paragraph [52] of the patent said:

“This passage discloses checking of the RLC buffer under the conditions of the MAC being able or unable to empty the buffer. This passage and the description as a whole does not disclose checking to determine whether the medium access control entity is transmitting data packets in a current air interface transmission time interval, by checking whether the medium access control entity is able to empty the radio link control buffer in the current air interface transmission time interval.”

50. In other words, the view of the Comptroller was that the application did not disclose the link between the able-to-empty check and a transmitting check.

Construction

51. The judge had to resolve many issues of construction, most of which are no longer relevant. At [162] to [167], however, he dealt with the interpretation of integer [C]. It was common ground that integer [C] was required to return a binary result. Depending on that result, the UE was required by integer [D] to wait until the next vTTI to transmit again. The dispute concerned a transitional TTI, i.e. one in which the UE moves from transmitting at the beginning of the TTI to not transmitting at the end of the TTI. Did that mean that, for the purposes of the claim, the UE was transmitting or not transmitting in the current TTI? In other words, what is the criterion by which one decides whether there is transmission in the current TTI?
52. Conversant submitted that it was clear that the patentee intended that if the MAC was no longer transmitting at the end of the TTI then the transmitting check should give a negative answer. This was consistent with the transmitting check being carried out by the able-to-empty check, which is what the amended claim required. If that check reveals that the MAC is able to empty the buffer in the current TTI, that indicates that the MAC will no longer be transmitting at the end of the TTI.
53. Huawei and ZTE disputed this for two reasons. First, they contended that the language of the claim meant that the check is whether the MAC is transmitting at any stage during the TTI, and it was immaterial that the MAC finishes transmitting during

the TTI. Secondly, they submitted that it was not possible to determine whether the MAC was transmitting by considering whether it was able to empty the RLC buffer. Whether the RLC buffer was able to be cleared was a different test to whether the MAC was transmitting.

54. The judge accepted Conversant’s submission on this issue, but noted its potential impact on the added matter issue:

“In my judgment Conversant is correct that, as a matter of construction of the claim as proposed to be amended, integer C involves checking whether the MAC is transmitting at the end of the current TTI. That is consistent with the check being carried out by checking that the MAC is able to empty the RLC buffer. If it were otherwise, then the Defendants would be correct that the check as to whether the MAC is able to empty the RLC buffer would not determine whether or not the MAC is transmitting. As will appear, however, it is also necessary to consider separately an issue as to added matter which arises (see paragraphs 219-227 below).” (emphasis supplied).

Relevant legal principles

55. In *AP Racing Ltd v Alcon Components Ltd* [2014] RPC 27 I summarised the law on added matter in this way:

“7. Section 72(1) of the Patents Act 1977 provides:

“(1) Subject to the following provisions of this Act, the court or the comptroller may on the application of any person by order revoke a patent for an invention on (but only on) any of the following grounds, that is to say –

...

(d) the matter disclosed in the specification of the patent extends beyond that disclosed in the application for the patent, . . .”

This provision is based on art.138(1)(c) of the European Patent Convention, which provides so far as material:

“(1) Subject to Article 139, a European patent may be revoked with effect for a Contracting State only on the grounds that:

...

(c) the subject-matter of the European patent extends beyond the content of the application as filed . . .;”

8. The issue of added matter falls to be determined by reference to a comparison of the application for the patent as filed and the

granted patent. As Aldous L.J. said in *Bonzel v Intervention Ltd* (No 3) [1991] R.P.C. 553 at p.574:

“The task of the Court is threefold:

- (1) To ascertain through the eyes of the skilled addressee what is disclosed, both explicitly and implicitly in the application.
- (2) To do the same in respect of the patent as granted.
- (3) To compare the two disclosures and decide whether any subject matter relevant to the invention has been added whether by deletion or addition. The comparison is strict in the sense that subject matter will be added unless such matter is clearly and unambiguously disclosed in the application either explicitly or implicitly.”

9. In the end the question is the simple one posed by Jacob J. (as he then was) in *Richardson-Vick Inc's Patent* [1995] R.P.C. 568 at p.576 (approved by him as Jacob L.J. in *Vector Corp v Glatt Air Techniques Ltd* [2007] EWCA Civ 805, [2008] R.P.C. 10 at [4]):

“I think the test of added matter is whether a skilled man would, upon looking at the amended specification, learn anything about the invention which he could not learn from the unamended specification.”

10. The policy behind the rule against adding matter was also examined in *Vector v Glatt* at [5] to [6]. One of the reasons for the rule which was identified is that third parties should be able to look at the application and draw a conclusion as to the subject matter which is available for supporting a claimed monopoly. If subject matter is added subsequently the patentee could obtain a different monopoly to that which the application originally justified.”

56. The *Bonzel* formulation was expanded on by Kitchin J (as he then was) in *European Central Bank v Document Security Systems* [2007] EWHC 600 (Pat) (in a passage subsequently approved by this court in *Nokia Corporation v IpCom GmbH & Co KG* (No. 3) [2013] RPC 5 at [7]):

“97. A number of points emerge from this formulation which have a particular bearing on the present case and merit a little elaboration. First, it requires the court to construe both the original application and specification to determine what they disclose. For this purpose the claims form part of the disclosure (s.130(3) of the Act), though clearly not everything which falls within the scope of the claims is necessarily disclosed.

98. Second, it is the court which must carry out the exercise and it must do so through the eyes of the skilled addressee. Such a person will approach the documents with the benefit of the common general knowledge.

99. Third, the two disclosures must be compared to see whether any subject matter relevant to the invention has been added. This comparison is a strict one. Subject matter will be added unless it is clearly and unambiguously disclosed in the application as filed.

100. Fourth, it is appropriate to consider what has been disclosed both expressly and implicitly. Thus the addition of a reference to that which the skilled person would take for granted does not matter: *DSM NV's Patent* [2001] R.P.C. 25 at [195]–[202]. On the other hand, it is to be emphasised that this is not an obviousness test. A patentee is not permitted to add matter by amendment which would have been obvious to the skilled person from the application.

101. Fifth, the issue is whether subject matter relevant to the invention has been added. In case G1/93, *Advanced Semiconductor Products*, the Enlarged Board of Appeal of the EPO stated (at para.[9] of its reasons) that the idea underlying Art.123(2) is that that an applicant should not be allowed to improve his position by adding subject matter not disclosed in the application as filed, which would give him an unwarranted advantage and could be damaging to the legal security of third parties relying on the content of the original application. At para.[16] it explained that whether an added feature which limits the scope of protection is contrary to Art.123(2) must be determined from all the circumstances. If it provides a technical contribution to the subject matter of the claimed invention then it would give an unwarranted advantage to the patentee. If, on the other hand, the feature merely excludes protection for part of the subject matter of the claimed invention as covered by the application as filed, the adding of such a feature cannot reasonably be considered to give any unwarranted advantage to the applicant. Nor does it adversely affect the interests of third parties.

102. Sixth, it is important to avoid hindsight. Care must be taken to consider the disclosure of the application through the eyes of a skilled person who has not seen the amended specification and consequently does not know what he is looking for. This is particularly important where the subject matter is said to be implicitly disclosed in the original specification.”

57. When amendment of a granted patent is being considered, the comparison to be made is between the application for the patent, as opposed to the granted patent, and the proposed amendment. The form of the granted patent before amendment does not come into the comparison: see *Nokia v IpCom* at [8]. The parties argued the present case by reference to the disclosure of the granted patent, which I have summarised above because they were agreed that it was in all material respects identical to the disclosure of the application.
58. A particular type of added subject matter is “intermediate generalisation”. In *Palmaz’s European Patents* [1999] R.P.C. 47, Pumfrey J described this at p.71 as follows:

“If the specification discloses distinct sub-classes of the overall inventive concept, then it should be possible to amend down to one or other of those sub-classes, whether or not they are presented as inventively distinct in the specification before amendment. The difficulty comes when it is sought to take features which are only disclosed in a particular context and which are not disclosed as having any inventive significance and introduce them into the claim deprived of that context. This is a process sometimes called “intermediate generalisation”.”

59. In the Decision G1/16 (*Disclaimer III*) (Decision of 18 December 2017) the Enlarged Board of Appeal of the EPO considered the allowability of disclaimers of subject matter which had no basis in the application as filed (so called undisclosed disclaimers). They expressed the object of the exercise in this way:

“The question to be asked in this context is not whether an undisclosed disclaimer quantitatively reduces the original technical teaching – this is inevitably the case as was explained above - but rather whether it qualitatively changes it in the sense that the applicant’s or patent proprietor’s position with regard to other requirements for patentability is improved.”

60. The mere fact that it is possible to point to language which does not appear *expressis verbis* in the application does not of itself give rise to added matter. As Morritt J said in *Molnlycke Ab and another v Procter & Gamble Ltd and others* [1994] RPC 49 at page 102 line 48:

“[I]f the relevant matter was disclosed, section 76(2) does not prevent an amendment which describes the same invention in a different way...”

The judgment on added matter

61. The judge dealt with this added matter objection at [219] to [226] of his judgment. The crux of his decision is at [224] to [225]:

“224. In considering this issue, the starting point is that there is clearly no explicit disclosure in the Application of a check to determine whether the MAC is transmitting in the current TTI. It follows that there is no explicit disclosure of a check to

determine whether the MAC is transmitting in the current TTI by checking whether the MAC is able to empty the RLC buffer in the current TTI. But there is an explicit disclosure of checking whether the MAC is able to empty the RLC buffer during the current TTI. It follows, as I see it, that the key question is what the skilled reader of the Application would understand the purpose and effect of that check to be. In my view the skilled reader would understand that the purpose and effect is as described in paragraphs 142-145 above. In short, the check is concerned with whether the MAC is able to empty the RLC buffer or not, and the consequences of that.

225. In my judgment it follows that the claim, both as granted and as amended, does disclose new information about the invention. Whereas the passage in the Application corresponding to [0052] discloses checking whether the MAC is able to empty the RLC buffer during the current TTI, and then either waiting to transmit until the next vTTI or transmitting in the next TTI, it does not disclose a check to determine whether or not the MAC is transmitting in the current TTI. This is not altered by the fact that, by the amendment, the latter check is to be carried out by checking whether the MAC is able to empty the RLC. This is not a question merely of what the claim covers, but of what the claim discloses.”

62. The judge therefore found the patent to be invalid on this ground.

The appeal

63. Mr Speck QC, who appeared for Conversant with Mr Mark Chacksfield QC and Mr Michael Conway, summarised the disclosure of [0052] of the patent as saying that the system was “active” in the sense that it was in a transmitting state at the beginning of the vTTI, and ceased to be in such a state at the end of the TTI within that vTTI in which it was able to empty the buffer. At the end of that TTI there was a prohibition on transmission until the beginning of the next vTTI, when it re-entered the “active” or “transmitting” state. Thus checking on the state of the buffer, and the ability to empty it, was a way of checking whether the system was or was not “active”.
64. The check disclosed in [0052] was not a check of whether the MAC was actually transmitting, and could not be so. That was because, as the specification explains, transmission can be blocked by higher priority data or by HARQ processes being reserved for re-transmissions. Thus the transmitting check in the claim would not be read by the skilled person as a check of whether the MAC was actually transmitting, but as a check of whether it was able to transmit. To read it otherwise would prevent it from covering the method disclosed by reference to Figure 5.
65. Mr Speck submits further that the point of integer [D] is that, if a negative answer to the check in integer [C] is received, i.e. the MAC is not in a transmitting state, then the claim imposes a prohibition on transmitting until the beginning of the next vTTI.

That feature did not imply that actual transmission had to commence in the next vTTI, merely that the ability to transmit was suspended until that point at the earliest.

66. Mr Speck illustrated his argument by reference to the code which a computer programmer would have to write to implement, first, the disclosure of the applications and secondly the text of the claim of the patent. He submitted that in each case this would involve the steps of asking whether the buffer is empty at the end of the air interface TTI, and, if it is, to impose the prohibition on transmission until the beginning of the next vTTI.
67. Mr Speck submitted that where the judge had gone wrong was by failing to consider integers [C] and [D] as a whole. Read as a whole, these integers were concerned with detecting the transition between the active and non-active states. He made similar criticisms of the approach in the Comptroller's letter.
68. The main submission of Mr Purvis was that both the transmitting check and the link between the able-to-empty check and the transmitting check were entirely new disclosures which the skilled person would not derive from the teaching of the application.
69. The amendment had been made in two stages. First, post-filing, the transmitting check was added, together with the consequences of the transmission check, namely, if not transmitting, transmitting again only after the current vTTI has elapsed. In the litigation, it was proposed to introduce a further restriction on integer [C], namely that the transmitting check is performed by the able-to-empty check.
70. The disclosure in the application as filed was concerned with whether the MAC may transmit in the air interface TTI itself, or whether it has to wait until the beginning of the next vTTI. Paragraph [0052] was concerned with an exception to that, which is where the MAC is permitted to check the buffer in special cases more frequently than once every vTTI. It was, however, a free-standing test with a clear purpose. It had nothing to do with checking whether the MAC was in fact transmitting during the air interface TTI.
71. The claim, by contrast, required a binary answer to whether the MAC was transmitting. A positive answer to the able-to-empty check meant that the MAC was not transmitting in the air interface TTI. This was on the basis of the construction urged by Conversant, namely that the claim was concerned with what was happening at the end of the air interface TTI, even if the MAC had been doing some transmitting at some point in the TTI. A negative answer to the able-to-empty check was probative of the fact that the MAC was transmitting, and meant that the MAC could continue to transmit in the next air interface TTI. There was no disclosure of either of those propositions in the application as filed.
72. Mr Purvis illustrated his argument by reference to a table produced by Huawei and ZTE's expert Dr Brydon:

Initial RLC Buffer Quantity	Able to Empty?	Is the MAC-d flow “transmitting” in this TTI?
10 Units	Yes – 10 units removed	Yes
10 Units	No – 5 units removed	Yes
10 Units	No – 0 units removed	No

Table 1: Exemplary RLC Buffer Checks

73. The first line in the table shows an able-to-empty test with a positive result, because all ten units of data were removed from the buffer. According to one’s normal understanding, the MAC would have been transmitting during this TTI. The judge had, however, accepted Conversant’s construction that what mattered was what happened at the end of the TTI, and on that basis the example in the first line of Dr Brydon’s table should have a “No” in the third column. That in itself was sufficient to suggest that there was added matter. Because the able-to-empty check had been dropped into the claim as a proxy for a transmitting check, Dr Brydon’s Table 1 had to be re-written.
74. Again, as a matter of construction of the claims, a negative answer to the able-to-empty check meant that the MAC was transmitting in that air interface TTI, and presumably transmitting right to the end of that TTI. That information was also not disclosed clearly and unambiguously in the application as filed. In fact there were many reasons why the MAC might not be able to empty the buffer in the current TTI, in particular where the MAC was not able to transmit the particular data at all during that TTI. In such a case the MAC would not be transmitting despite a negative answer to the able-to-empty check.
75. Mr Purvis illustrates this point by reference to the diagram from Professor Marshall’s report which I have set out at [72] above. The diagram shows 4 buffers with data in them, none of which can be emptied. However only two of them are transmitting in the air interface TTI. The buffers are capable of being emptied in the time frame, but in fact not able to be emptied because of higher priority data, or because of multiplexing rules. Accordingly, absent the amended claim, the skilled person would understand that the system decided on whether the MAC would transmit data from a buffer based on considerations which were not necessarily connected to whether the buffer was able to be emptied.
76. Mr Purvis went on to submit that the construction argument now advanced, in which the transmitting check was to be read as a check as to whether the MAC was able to transmit rather than actually transmitting, was not open to Conversant, as it had not been properly ventilated below. The consequences of such a construction had not been explored with the expert witnesses. For example the table put forward by Dr Brydon (see paragraph [72] above) would have required exploration in the light of

this revised construction. Further, as is well known, the correct interpretation of the claim may impact on the other issues in the action, such as infringement and essentiality. The judge had explained that the term “transmit” and the noun “transmission” generally referred to the process of handing down data from one layer to the layer below. The grounds of appeal did not challenge that interpretation, and had been framed entirely by reference to the actual transmission of data. Moreover Conversant’s skeleton did not contain any reference to this construction of transmitting, or spell out precisely what is meant by that term.

77. If, nevertheless, we were to permit the point to be taken, Mr Purvis submitted that Conversant’s new construction argument brought with it difficulties of its own. Professor Marshall’s worked example included the case where a buffer was not able to empty and yet was not transmitting (because, for example, it has had to give way to higher priority data). Conversant’s argument sought to deal with this by saying that the MAC-e was nevertheless able to transmit. That was, however, not the case. The higher priority bits were preventing the MAC-e from transmitting. In a determinative system there was, in fact, no way of answering the question of whether an entity is able to transmit other than by asking whether it has actually transmitted. The MAC-e was always ready, willing and able to transmit.
78. Next, Mr Purvis dealt with the suggestion that, if “transmitting” is read as “actually transmitting”, the claims would not cover the embodiment depicted by reference to Figure 5. He made the following points:
- i) Figure 5 was only concerned with illustrating the vTTI invention in the context of a particular MAC-d data flow, namely VOIP data.
 - ii) Figure 5 was a very generalised disclosure which was not seeking to illustrate what was taught in the specification at [50] and [52].
 - iii) Everywhere in the patent, including in the text describing Figure 5, the word “transmit” was used in the usual sense of actually sending data packets to the next layer in the stack. Conversant had not identified any instance of the use of that word in the sense of “able to transmit”.
79. Mr Speck’s response to the procedural point was that the substance of what was being argued on construction was before the judge.
80. We invited Mr Speck, if we were against him on whether his construction point had been properly ventilated below, to show us a draft ground of appeal setting out precisely what construction he contended for. Following the conclusion of argument he provided the following draft ground:

“8A. Further or alternatively, if and insofar as the judge reached his conclusion on added matter in reliance upon a construction of the claim that disclosed a method that requires data from each RLC buffer to which the method was applied to be taken from the respective RLC buffers and handed down to PHY in every TTI in which there was any such data in the respective RLC buffers, he was wrong in doing so.

Claim 1 is directed to the detection of the transition between the active transmitting state in which transmission is allowed under the vTTI and the non-active state. “Is transmitting” and “is not transmitting” in integers C and D of the claim would be understood accordingly. In particular on the proper construction of the claim, it would be understood that MAC was ‘transmitting’ i.e. in the active transmitting state, in circumstances where there is data in the respective RLC buffers, but none is in fact taken and handed down to the PHY, when some other higher priority activity prevents this from occurring, for instance, the existence of higher priority data or the blocking of the TTI by an occupied HARQ process.”

Assessment

81. The first question is to determine what, of relevance, the skilled person would learn from the application as filed. I have explained what [50] of the specification discloses. It tells the reader that the MAC could check the RLC buffer once every vTTI in the same way as the MAC would normally check the buffer once every normal (air interface) TTI. Packets received during the vTTI have to be buffered in the RLC buffer, and the packets so buffered would be stored until they could be transmitted in the next vTTI. In some special cases, however, the MAC is permitted to check the RLC buffer more frequently than once per vTTI, and thus the MAC is able to transmit during more than one TTI every vTTI.
82. The special cases identified where the MAC is permitted to check more frequently than once per vTTI are (a) where it is not possible to clear the buffer due to power limitations; (b) where there is transmission of higher priority packets from other RLC buffers; or (c) if there are bigger RLC SDUs that cannot be transmitted within one TTI.
83. The passage in [52], as interpreted by the judge, discloses that (i) if the MAC is able to empty the RLC buffer in a particular TTI it stops transmitting and waits until the next vTTI before transmitting again and (ii) if the MAC is not able to empty the RLC buffer in that TTI then it will check the RLC buffer in the next TTI and transmit the excess data in that TTI. It continues to do this until the RLC buffer is empty. This permits rapid clearing of RLC buffers.
84. The able-to-empty check disclosed by these passages is thus disclosed as a restriction on transmission. If the answer to the able-to-empty check is affirmative, then transmission is stopped until the next vTTI. If the answer to the able-to-empty check is negative then transmission may continue in the next TTI within the vTTI until the buffer is cleared. There is no reference, either express or implied, to a transmitting check operating this restriction on transmission.
85. Next, it is necessary to ask what is disclosed by the amended specification. Integer [C] discloses a check to determine whether the MAC is transmitting data packets in a current air interface TTI. It does so by checking whether the MAC is able to empty the RLC buffer in the current air interface TTI. Integer [D] discloses that, for the case where it is determined that the MAC is not transmitting in the current air interface TTI, a next data packet is transmitted only after a period determined by the vTTI is

determined to have elapsed. The criterion for whether the MAC is transmitting in a current air interface TTI is whether it is transmitting at the end of the TTI. If it transmitted at some point during the air interface TTI, but stopped transmitting, it is treated as not transmitting in that air interface TTI.

86. Because the disclosure is in the claim, it is necessary to bear in mind that one is not concerned with what the claim covers but with what it discloses. I also accept Mr Speck's submission that it is necessary to consider the disclosure of the claim as a whole, and wrong to consider integers [C] and [D] successively and in isolation. The corollary of that submission is that it is irrelevant how the claim came to be written in this form. In particular it is irrelevant that the claim was amended in two stages, first by the addition of the transmitting check and then by the addition of the able-to-empty check, and the link between the two checks. It is therefore not strictly necessary to consider further Mr Speck's submission that the amendments introduced in the litigation were an attempt to avoid an intermediate generalisation created by the earlier amendment to introduce the transmitting check. I would note only that it is inherent in that suggestion that a generalised disclosure of the transmitting check was present in the application as filed. That proposition is vigorously contested by Huawei and ZTE.
87. The first thing which strikes one when comparing the two disclosures in the manner required by the authorities is that the introduction of the transmitting check seems to add a layer of complexity which is wholly unnecessary if the object of the claim was to mirror precisely the disclosure of the application as filed (represented by the specification at [0050] and [0052]). Whereas in the application the answer to the able-to-empty check operates the restriction on transmission, in the claim it is the answer to the transmitting check (albeit performed by the able-to-empty check) which does this.
88. The second point to note is that, as discussed above, Conversant persuaded the judge to accept a special meaning of "transmitting data packets in a current air interface transmission time interval" in integer [C] to deal with the case of the transitional TTI. Pursuant to that construction, what mattered was whether the MAC was transmitting at the end of the TTI, and it was irrelevant that it was transmitting at some earlier point in that TTI. The reason for this conclusion was that the transmitting check was performed by the able-to-empty check. The link between the able-to-empty check and a transmitting check is, however, not disclosed in the application as filed. As Mr Purvis demonstrated by reference to Dr Brydon's table (see [72] above) a transmitting check based on the disclosure of the application alone would not be so understood.
89. The third point of importance is that the claim discloses that the answer to the able-to-empty check is capable of determining whether the MAC is transmitting. This follows from the use of the words "by checking". The application, however, does not disclose that it is possible to determine whether the MAC is transmitting by checking whether it is able to empty the RLC buffer. There are supervening factors which will prevent the MAC from transmitting even though it is unable to empty the buffer in the current TTI. It would not occur to the skilled reader of the application that the able-to-empty check was determinative of whether the MAC was transmitting. Indeed, if he or she were to be asked whether the able-to-empty check told one whether the MAC was transmitting, they would answer, on the basis of the disclosure of the specification, that it would not.

90. It follows that, if one gives the word “transmitting” its ordinary or literal meaning, then the claims of the patent disclose matter which is not disclosed in the application as filed. That brings me to Conversant’s argument that transmitting is to be given a different meaning, and that the check is as to whether the MAC is able to transmit, or active.
91. The approach of this court to allowing new points to be argued if they were not argued below was recently summarised by Haddon-Cave LJ (with the agreement of McCombe and Moylan LJ) in *Singh v Dass* [2019] EWCA Civ 360 at [16] to [18]:
- “16. First, an appellate court will be cautious about allowing a new point to be raised on appeal that was not raised before the first instance court.
17. Second, an appellate court will not, generally, permit a new point to be raised on appeal if that point is such that either (a) it would necessitate new evidence or (b), had it been run below, it would have resulted in the trial being conducted differently with regards to the evidence at the trial (*Mullarkey v Broad* [2009] EWCA Civ 2 at [30] and [49]).
18. Third, even where the point might be considered a ‘pure point of law’, the appellate court will only allow it to be raised if three criteria are satisfied: (a) the other party has had adequate time to deal with the point; (b) the other party has not acted to his detriment on the faith of the earlier omission to raise it; and (c) the other party can be adequately protected in costs. (*R (on the application of Humphreys) v Parking and Traffic Appeals Service* [2017] EWCA Civ 24; [2017] R.T.R. 22 at [29]).”
92. We were not shown any material which suggested that the judge was asked to interpret “transmitting” in the way now contended for by Conversant. The passage from Conversant’s opening skeleton argument on which Mr Speck relied is as follows:
- “We submit that the skilled addressee would understand that the patentee intended that checking whether the MAC was transmitting would include the situation in which in a particular TTI the MAC goes from a state in which it was transmitting to a state in which it was not; or in other words where it was not or no longer transmitting by the end of that TTI.”
93. Contrary to Mr Speck’s submission, that passage seems to me positively to adopt the literal meaning of “transmitting”. It does not flag up any argument about transmitting not being required to occur. Mr Speck sought to extract something from the use of the word “state”, but that does not give any forewarning of an argument that a “state in which it is transmitting” could include a state in which it was not.
94. The point is therefore a new one. It follows that it is most unlikely that it was adequately ventilated in the evidence at the trial. The materials relied on by Mr Speck

to suggest that the point was examined at trial do not, in my judgment, support his argument.

95. First, Mr Speck showed us some evidence given by Conversant's expert witness, Professor Marshall in paragraph 194 of his first report:

“The second [point] concerns the checking of whether ‘the MAC entity is not transmitting in the current air interface TTI’, in the final integer of claim 1. The Skilled Person would understand that the patentee intended that this would include the situation in which in that TTI the MAC went from a state in which it was transmitting to one in which it was not; in other words where it was not or no longer transmitting by the end of the TTI. Technically, the Skilled Person would see from the Patent that what is key is that the method identifies the transition from the transmitting to the non-transmitting states, and hence triggers the inhibition of new transmissions until they become allowed under the next vTTI. The exact details of the mechanism by which that transition is detected are not particularly important to the invention, but the Skilled Person would see that a narrowly read claim would potentially exclude the way that the Patent describes the operation of the invention in the MAC particularly in [0052].”

96. To my mind, this passage in Professor Marshall's evidence does not assist Mr Speck's argument. That evidence is dealing with the criterion to be applied when the MAC is transmitting at the beginning of an air interface TTI, but not at the end. The point he is making is that the system must detect the transition from transmitting to not transmitting, so as to trigger the prohibition on transmitting until the next vTTI. It does not throw any light on whether the disclosure is solely concerned with the ability to transmit, as opposed to actual transmission.

97. Secondly, Mr Speck relied on a sentence from Professor Marshall's second report at paragraph 65 where he said:

“the Skilled Person would understand that when the claim refers to whether or not the MAC “is transmitting” in a particular TTI, that includes when the RLC buffer contains packets which the MAC is permitted to send under the vTTI cycle but that they are blocked by a retransmission, as can be seen for example in Figures 5-7 of the Patent.”

98. This passage is at least in the right territory, because it suggests that, in the particular case where transmission of packets is blocked by a HARQ re-transmission, the MAC is treated as if it was transmitting. But it is a long way from what Mr Speck now submits, namely that the skilled person would not understand the disclosure as requiring a check for actual transmission at all. Professor Marshall's language, that “transmitting” *includes* the special case of HARQ blocking does not seem to me to be consistent with the new construction at all.

99. Thirdly, Mr Speck, in a post hearing email, also invited us to consider a single paragraph from his client’s closing submissions before the judge at paragraph 160:

“First Dr Brydon agreed that the vTTI described in the Patent is what imposes the minimum time interval between transmissions. As he acknowledged, this operates to provide a pattern of permitted starting points; the actual pattern of transmissions – the actual time interval between transmissions – can vary (due for example to the interpolation of retransmissions – as shown through each of figures 3, 5 and 7 in the Patent).”

100. I do not think this passage takes the argument much further. It certainly does not go as far as to suggest that “transmitting” in the claim is not concerned with actual transmission at all.
101. It follows, in my judgment, that Conversant’s new construction of “transmitting” was not properly ventilated at trial. The next question to consider is whether, had it been properly raised at trial, there would have been a need for new evidence.
102. Although the meaning of a document is, in the end, a question of law, the correct interpretation of a passage in a patent specification is a matter to which evidence of those skilled in the art can be relevant. This can take a number of forms. Whilst evidence of the meaning of ordinary English words is inadmissible, experts are frequently, and properly, asked to address the consequences of a particular term, on assumptions as to its meaning. They also conventionally address the relevant factual matrix, i.e. the common general knowledge. There are real difficulties with the construction now advanced by Conversant, which it is reasonable to assume that Huawei and ZTE would have wished to explore with Conversant’s expert. Amongst these is the question (to which Mr Purvis referred) of how one determines whether the MAC is “in an active state” or “able to transmit” if one is not to do so by checking whether it is actually transmitting. I am not persuaded that Huawei and ZTE had a proper opportunity of addressing this potential construction of the claim in evidence at the trial.
103. There is a further reason why I am not persuaded that it would be fair to Huawei and ZTE to allow the new construction to be raised for the first time on appeal. The issue as to the meaning of “transmitting” did not appear in Conversant’s grounds of appeal or skeleton argument. Indeed, it did not surface until it was addressed by Mr Speck in oral submissions in this court. Mr Speck submitted that his construction arose out of the way in which Huawei and ZTE put their case in their skeleton. But even if that were correct Conversant received Huawei and ZTE’s skeleton on 5 May 2020, some 6 weeks before the hearing. Huawei and ZTE should have been given notice of the new point before Mr Speck got to his feet in this court.
104. I do not accept, however, that the new argument was necessitated by Huawei and ZTE’s skeleton. It was obvious that Conversant needed to deal with the absence of a transmitting check from the application as filed. The judge had given “transmitting” its normal meaning. It follows that it was for Conversant to challenge that meaning in its appeal if it was going to do so.

105. Huawei and ZTE have abandoned a long list of points originally raised by way of respondent's notice. It is fair to assume that they did so on the basis of the claim construction adopted by the judge. It is also reasonable to infer, as Mr Purvis invites us to do, that the new construction might have had an impact on these other issues, and affected the decision as to whether they should be dropped. It would be unjust in those circumstances to allow Conversant to advance new arguments on construction.
106. I would not, therefore, allow this new construction argument to be run for the first time in this court. It is not therefore necessary to consider Mr Purvis' points as to the difficulties with the new construction, save to note that they appear to me to have potential force. I wish only to deal with one further question, which is whether the points argued by Mr Speck establish that the skilled person would understand that a system in which the transmitting check was a check of whether the MAC was actually transmitting was not disclosed. Unless the new construction argument has that consequence, then it will not avoid the allegation of added matter.
107. Here it is particularly important to remember that one is asking what the claim discloses, as opposed to trying to determine the limits of its scope. Conversant's main argument for concluding that "transmitting" does not mean "actually transmitting" is that, if it were so construed, it would not cover the specific embodiment of Figure 5, where transmission can be blocked by re-transmissions etc. That is a plausible argument for saying that the *scope of the claim* must include cases where the transmitting check reveals that the MAC is not actually transmitting, but would be transmitting but for this supervening factor. In my judgment, however, that consideration does not mean that the claim does not also disclose a transmitting check which checks on whether the MAC is actually transmitting. That is, after all, what it says.
108. The point is particularly clear from the way in which Conversant put its argument on how the claim dealt with the transitional TTI, in the passage I have quoted in paragraph [92] above. That argument seems to me to have proceeded on the basis that the claim is dealing with actual transmission: what the MAC is actually doing at any given point within the TTI. It could not have proceeded on that basis if the claim language excluded consideration of actual transmission, as Conversant now contends.
109. I should add for completeness that I do not accept Mr Speck's argument that, in terms of computer programming, what the claim discloses is the same as what is disclosed by paragraph [0052] of the specification. The able-to-empty check is of course the same, but the argument ignores the presence of the transmitting test. The argument is a roundabout way of writing the transmitting test out of the claim altogether.
110. To summarise, Conversant has not satisfied me that the skilled person would understand that the literal meaning of "transmitting" is excluded. A system which actually checked on whether the MAC was transmitting would be exactly as described by the claim, and was not disclosed in the application as filed.

111. For those reasons, I would dismiss the appeal.

Appendix

Glossary of abbreviations

Abbreviation	Meaning
CDMA	Code Division Multiple Access
E-DCH	Enhanced Dedicated Channel
HARQ	Hybrid Automated Repeat Request
HSUPA	High Speed Uplink Packet Access
MAC	Medium Access Control
OSI	Open Systems International
PDU	Protocol Data Unit
PHY	Physical layer
RAB	Radio access bearer
RAN	Radio Access Network
RLC	Radio Link Control
RNC	Radio Network Controller
RoT	Rise over Thermal
SDU	Service Data Unit
TTI	Transmission Time Interval
UE	User Equipment
UMTS	Universal Mobile Telecommunications Standard
VOIP	Voice over Internet Protocol
vTTI	virtual TTI

Lord Justice Newey:

112. I agree.

Lord Justice Patten:

113. I also agree.