Neutral Citation Number: [2020] EWHC 14 (Pat)

Case No: HP-2017-000048

IN THE HIGH COURT OF JUSTICE
BUSINESS AND PROPERTY COURTS OF ENGLAND AND WALES
INTELLECTUAL PROPERTY LIST (ChD)
PATENTS COURT

Royal Courts of Justice
The Rolls Building
7 Rolls Buildings
Fetter Lane
London EC4A 1NL

Date: 08/01/2020

Before :

MR JUSTICE BIRSS

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Between :

CONVERSANT WIRELESS LICENSING S.à.r.l	**Claimant**
- and -	
(1) HUAWEI TECHNOLOGIES CO. Ltd	
(2) HUAWEI TECHNOLOGIES (UK) CO. Ltd	
(3) ZTE CORPORATION	
(4) ZTE (UK) Ltd	**Defendants**

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Tom Moody-Stuart QC, **James Whyte** and **Charles Brabin** (instructed by **EIP Legal**) for the **Claimant**
Michael Tappin QC, **Henry Ward** and **Miles Copeland** (instructed by **Allen & Overy**) for the **First and Second Defendants**
Michael Tappin QC and **Henry Ward** (instructed by **Bristows**) for the **Third and Fourth Defendants**

Hearing dates: 7th, 8th, 9th, 11th, 15th, 17th, 18th and 21st October 2019

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Approved Judgment

I direct that pursuant to CPR PD 39A para 6.1 no official shorthand note shall be taken of this Judgment and that copies of this version as handed down may be treated as authentic.

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MR JUSTICE BIRSS

Mr Justice Birss :

Introduction

1. This is a patent action concerning EP (UK) 1 878 177, EP (UK) 3 267 722 and EP (UK) 3 197 206. The latter two patents are divisionals from the 177 parent patent. The patents originated from Nokia but are now held by the claimant (Conversant), which is a Luxembourg company. The patents have been declared essential to various telecommunications standards relating to 3G (UMTS) and 4G (LTE) technology. Conversant contends that the patents are valid and essential. The first and second defendants (Huawei) and the third and fourth defendants (ZTE) implement 3G and 4G technology in the UK. The first and third defendants are Chinese companies. The second and fourth defendants are UK companies. Without prejudice to a pending jurisdiction challenge, the defendants contend the patents are invalid and not essential. This is one of the technical trials in a series between these same parties. Arnold J gave judgment in the first technical trial, relating to a different patent, on 4th July 2019 ([2019] EWHC 1687 (Pat)).

2. The patents are all entitled "*Fixed HS-DSCH or E-DCH allocation for VOIP (or HS-DSCH without HS-SCCH/E-DCH without E-DPCCH)*". Put into English, this title refers to the idea of having a fixed allocation of resources on a shared telecommunications data channel (e.g. HS-DSCH), or to having messages on the data channel without messages on a shared control channel (e.g. HS-SCCH). This is all said to be in the context of VOIP. VOIP stands for Voice Over IP and refers to techniques such as Skype whereby voice signals are sent over an internet protocol network. In fact the patents are not limited to VOIP.

3. The channels named HS-DSCH and HS-SCCH relate to a feature of UMTS called HSDPA, which stands for High Speed Downlink Packet Access. HSDPA was an

important development. It was what really started mobile telephone users accessing the internet on their devices in a manner similar to the one they were used to on desktop computers. That is because it facilitated high data rates.

4. The parent application was filed on 25th April 2006 claiming priority from a US filing on 26th April 2005 (US 675127 P). The application was first published as an international application under the PCT on 2nd November 2006 (WO 2006/114689). The 177 patent was granted on 21st June 2017, the 722 patent was granted on 27th March 2018, and the 206 patent was granted on 3rd April 2019. Conversant has applied to amend the 177 and 722 patents.

5. The claims which fall to be considered are:

   i) For 177 – claims 19, 20 (as dependent on 19) and 35 as proposed to be amended unconditionally;

   ii) For 722 – claims 2, 3 (as dependent on 2), 13, and 14 as proposed to be amended unconditionally;

   iii) For 206 – claim 1 as granted.

   The text of these claims is set out in the annex.

6. Conversant contends all these claims are independently valid. Claims 19 and 20 of 177 are dependent on claim 18 and a number of the issues relate to text in that claim. However claim 18 is not advanced separately by Conversant because at the CMC I directed that the maximum number of independent claims it could assert as independently valid and essential was nine. Even allowing nine was generous since these patents are divisionals. Similarly for the 722 patent claims 2 and 3 are dependent on claim 1 and a number of issues relate to the text of that claim. The ninth claim relied on by Conversant up trial was a conditionally amended form of claim 18 but that amendment was dropped, I think because Conversant decided it was unnecessary given the way the issues had developed.

7. For 206 the only relevant claim is claim 1.

8. Conversant contends that all the relevant claims in 177 and 722 are essential to the LTE standard insofar as it relates to a feature called semi persistent scheduling (SPS). In particular this relates to all versions of LTE release 8 and onwards of the 3GPP technical specifications TS 36.321, TS 36.213 and TS36.331.

9. Claim 1 of 206 is said to be essential to the feature known as HS-SCCH-less operation in UMTS from release 7 and onwards. In particular this relates to 3GPP technical specifications TS 25.331, TS 25.212 and TS 25.214.

10. The defendants have made common cause in this action. They contend that the relevant claims of 177 and 722 are invalid because they involve added subject matter. They challenge the claim amendments on the same grounds and also challenge the amendments as lacking support. In terms of prior art they rely on a single citation. It is the PhD thesis of Robert Bestak who was a doctoral student at the Telecom

University of Paris. It was published on 18th April 2004. The defendants argue that certain claims of 177/722 lack novelty while all claims are obvious over Bestak.

11. In relation to 206 the only validity issue is priority. If claim 1 loses priority then it is common ground in these proceedings that it is invalid. The defendants have dropped their validity attack as at the claimed priority date so if claim 1 maintains priority, it is valid.

12. The only area in which the positions of the two groups of defendants might differ relates to implementation but as I understand it by the end of the trial there was no issue which this judgment had to resolve about that.

The witnesses

13. Conversant's expert witness was Mr Neil Wiffen. Mr Wiffen is a cellular communications consultant and trainer, educating engineers in the area of wireless and fixed telecommunications. He has worked on wireless systems and communications for the Royal Engineers, GCHQ and in a private consulting capacity over the course of 18 years.

14. The defendants' expert witness was Professor Timothy O'Farrell. Professor O'Farrell is the Chair Professor in Wireless Communications at the University of Sheffield and he has held this role since 2011. He has managed 26 major research projects and published extensively on packet scheduling and modulation and coding for wireless communications systems amongst other topics.

15. Mr Wiffen's evidence supported Conversant's case on validity and essentiality while Professor O'Farrell supported the defendants' case.

16. The defendants submitted that Mr Wiffen had spent a lot of time recently as an expert witness; that his training experience allowed him to contend he was an expert in all standards and layers but that (although they never put it quite this way) that was not credible; that his CV had been tailored for the case and his normal CV did not mention HSDPA; that he had no experience of network design and improvement; that he did not approximate to the skilled person; that the idea that he had insight into the way skilled people think due to his interaction with them when conducting training should be treated with caution because his training was about implementing the standards; that the workshops (and lectures) he undertook cannot sensibly give such an insight.

17. These submissions are over-stated. Mr Wiffen was in a position to educate the court about the technology, including the relevant detail (HSDPA). As a trainer of those skilled in the art he was in a position to give evidence about how the skilled person would think. I will take into account the fact that he himself was not a network designer but that does not disqualify him from giving relevant evidence.

18. Separately the defendants criticised Mr Wiffen's written and oral evidence. They submitted it changed over time and that he raised new points in later rounds of evidence and in the witness box. This was said to undermine his evidence about what would immediately or obviously occur to a person at the time they read various documents. Such a point may or may not have a bearing when one examines a

particular issue (and I will take the individual points in context) but stated generally as the defendants also do, I reject the submission. The primary role of an expert witness in a patent case is to explain the technology and, when they give an opinion about something, to articulate their reasons why that is so or why they disagree with another expert's contrary view. The progress of the individual's expert reports and oral evidence is not there to stand as a single data point proxy for the notional person skilled in the art. Although the skilled person and the common general knowledge are founded in reality, they are ultimately legal constructs which have different characteristics from those of any normal human being. It is a common experience in highly technical patent litigation that it can take a great deal of time and effort before one can decide what would (or would not) immediately occur to that notional skilled person.

19. The defendants also submitted that Mr Wiffen took an inconsistent approach in various ways. Although they did not use the word, the defendants' argument was that this inconsistency was biased in favour of Conversant's case. The three alleged inconsistencies were (i) reading detail into documents sometimes but not doing so on other occasions; (ii) taking the view that a term in one context in one document would be broadly understood while in another context in the same document it would not be; and (iii) being "blind" to passages said to be inconsistent with an interpretation of a disclosure he had arrived at. To the extent they are relevant the particular points will need to be dealt with individually but again I did not detect anything about these alleged inconsistencies which would support taking a view of Mr Wiffen's evidence in general.

20. Where the defendants have a point is that Mr Wiffen was prepared to read a very great deal into relatively short passages of text in the patents and the priority document. My concern is not about whether Mr Wiffen did this in an inconsistent manner, since after all these things are always context specific, but it did occur to a striking degree in this case. It is notable that in ***RIM v Motorola*** ([2010] EWHC 118 (Pat)) Arnold J identified Mr Wiffen as having engaged in detective work in a similar way. It is something I will take into account.

21. Aside from Mr Wiffen's tendency to read a lot into short passages of text, overall in my judgment he gave his evidence honestly and was doing his best to try to help the court with his answers.

22. By contrast to their submissions about Mr Wiffen, the defendants submitted that Prof O'Farrell had a wealth of experience in the field, was an extremely careful witness and gave evidence of great assistance to the court. Before I deal with what Conversant said about Prof O'Farrell, I will say that the contrast between what the defendants submit about Mr Wiffen and about Prof O'Farrell is remarkable. They must have been at a different trial. To anticipate my conclusion about Prof O'Farrell, he also was qualified to express the opinions he did, although his particular experience has to be taken into account, and he also gave his evidence fairly and honestly, doing his best to help the court, although there is at least one aspect of that which I will take into account.

23. Conversant contended that Prof O'Farrell gave his evidence from an academic perspective. The defendants submitted Prof O'Farrell had practical commercial research experience too. So he did but in my judgment his perspective did tend

towards an academic one to a more than trivial degree, albeit nowhere near enough to disqualify him. Conversant also says that his evidence on a particular crucial issue about common general knowledge and VOIP was flawed, but I will address that in context. Conversant submitted Prof O'Farrell did have a tendency to be unnecessarily fastidious about the use of language. The defendants contended that there was nothing in this and that it arose from "extraordinarily detailed scrutiny" of his language in cross-examination. That is what the defendants mean by calling the professor "an extremely careful witness." In my judgment, when he felt under pressure, Prof O'Farrell did sometimes take refuge in an overly precise approach to language. It was not a serious flaw in his evidence, but it is something I will take into account.

The skilled person

24. To explain the arguments about the identity of the person skilled in the art a bit of background is needed. A key concept in the field of telecommunications networks is the idea of the protocol layer stack. This has been explained in other judgments. Rather than write another bespoke introduction to the same issue, I refer to paragraphs 8 to 15 of the judgment of Arnold J in ***RIM v Motorola*** (above), to paragraphs 19-27 of my judgment in ***Vringo v ZTE*** [2014] EWHC 3924 (Pat), and to paragraphs 20-29 of my judgment in ***Unwired Planet v Huawei*** [2015] EWHC 3366 (Pat). All three of those cases were concerned with priority dates well before 2005.

25. Conversant submitted that the person skilled in the art is an engineer working at the boundary between layer 1 and layer 2. Layer 1 is the physical layer and layer 2 is the data link layer, which includes the Medium Access Control or MAC layer. This was Mr Wiffen's evidence and the basis for his opinions, particularly concerning common general knowledge and obviousness.

26. The defendants submitted that the person skilled in the art was a team led by the RAN Architect (RAN stands for Radio Access Network). The team could include engineers working at the physical layer, MAC layer and other higher layers such as the Radio Link Control (RLC) layer and the Radio Resource Control (RRC) layer of the protocol stack. Although the defendants' case was put as if the skilled person was a team, in reality the critical member of that team given the way the defendants' case was put and Prof O'Farrell's evidence in support of it, was the RAN architect team leader.

27. In the end I have little doubt that the relevant skilled person is a team of engineers of the kind proposed by Prof O'Farrell and with a team leader who is a RAN architect. The team would include Mr Wiffen's skilled person, that is a person or persons working at the boundary between layer 1 and layer 2. A different question however is the extent to which the leadership of that team by the RAN architect comes into play. That is best dealt with in context.

The common general knowledge

28. There is a mass of technical background which one needs to know to understand this case. None of it is contentious and it is not realistic to set it all out.

29. The most important issue relating to the common general knowledge is about something called the VOIP overhead problem. Related to this is some nuance about context, concerning real time data services and HSDPA. There is also some nuance about the idea of reducing control information. I will deal with these in reverse order.

30. The "reducing control information" point is the following. The defendants submitted, supported by Prof O'Farrell, that the common general knowledge included the principle that one should reduce control information where possible. They also submitted that Mr Wiffen did not really disagree. I do not accept it is as simple as that.

31. What this is about is that in a communications network one cannot just send data from one place to another. Simply in order to make everything work, some of the signalling has to be of control information. But sending control information takes up resources which could have been used for data. Since you always want to send as much data as possible, it is therefore a truism that engineers always want to ensure that the amount of control signalling is no more than necessary to deliver the intended data (as Prof O'Farrell said). As Prof O'Farrell also said, it is a general principle of communication theory that for the purposes of efficiency a system should always seek to minimise signalling wherever possible. In my judgment these statements are not wrong but they can be misapplied because they are extremely general. The phrases "wherever possible" and "no more than necessary" do not mean that the skilled team, as part of their common general knowledge, is constantly on the look out for any conceivable reduction in control information. Singling out this principle gives it too much emphasis. It is one of a wide range of factors the skilled team has to balance, many of which pull in different directions. And thinking about a possible impact on control information of a step under consideration is not necessarily something which would be considered at all. It may or may not be.

32. The reason why this is so is the following. In reality these issues are a matter of degree. Stated generally quite a lot of control information is strictly unnecessary in the sense that data could be sent without it, but the control information is sent because that enhances the flexibility of the system. This is not an abstract idea. A critical and well understood feature of HSDPA was that a great deal of control information was sent for every single packet of data. The reason for that high quantity of control information was to facilitate flexibility at the level of the system as a whole. It would not increase the amount of data being sent to a given device at a given time but would greatly enhance the amount of data the system could send as a whole to multiple devices. The large amount of control information sent with HSDPA meant that resources on a shared data channel allocated to one user in one 2 millisecond long Transmission Time Interval (TTI) period could be allocated to a completely different user in the next 2 millisecond TTI, and so on. This has been referred to as the dynamic allocation of resources.

33. I express the conclusion of this point in the following way. One aspect of design which the skilled team would take into account as a matter of common general knowledge was the utility of the control information, bearing in mind that networks strive to send as much data as practical but also bearing in mind that control information can have benefits at the level of the system as a whole, such as facilitating flexibility.

34. At the priority date the most recent set of telecommunications standards released in the UK related to the HSDPA feature in UMTS. As I have said already, this was a significant step. The position was as follows.

35. The traditional telephone system is based on the idea of a circuit switched network. In a circuit switched network a communications channel is dedicated for the duration of the connection. This was true for traditional land line telephone calls and was true for the GSM (2G) system. While a phone call was in progress a communications channel was dedicated to that call.

36. One reason for the development of UMTS (3G) had been a concern with improving the mobile network service for internet protocol (IP) based data services. The then standard circuit switched connections were not well suited to the transmission of such data. That is because transmission of such data does not normally need a communications channel to be dedicated for an appreciable period. One reason why is that internet traffic, such as is caused by web browsing, is "bursty" in nature, meaning that the data comes in short bursts. Not all internet traffic is like that but a lot of it is.

37. UMTS itself was launched in about 2000. Both GSM and UMTS were digital systems in which the sounds of the user's voice was digitised and sent across the radio network as a stream of digital data. The difference between GSM and UMTS was that GSM was a Time Division Multiple Access (TDMA) system whereas UMTS was a Code Division Multiple Access (CDMA) system. In other words when a base station sent data to a mobile phone in GSM, that data was sent in a given time slot (there were 8 possible slots in a given frequency band). The phone knew to "listen" for data addressed to it in that slot. All the data in that slot was for that phone. Those resources were allocated to the phone for the duration of the phone call. Whereas in UMTS, although the signals were sent in repeating time intervals (TTIs), instead of resources being shared out based on dedicated time slots within those intervals, different encryption codes were allocated to each mobile phone (and for other channels). So a phone knew it should "listen" for signals sent using the code which had been allocated to that phone. All the data with that code was for that phone. The codes are sometimes called channelisation codes because each code defines a separate channel of communication.

38. UMTS was an advance over GSM but UMTS alone did not achieve the quality of service requirements for IP based data services. HSDPA was an additional development within UMTS. Its purpose was to enable greater downlink peak data rates for IP data services than UMTS alone, while enhancing resource efficiency. Nevertheless again it was considered that voice services would continue to be handled by the circuit switched part of UMTS which was separate from HSDPA. A diagram (actually taken from the Bestak prior art) showing the network architecture of UMTS is as follows:

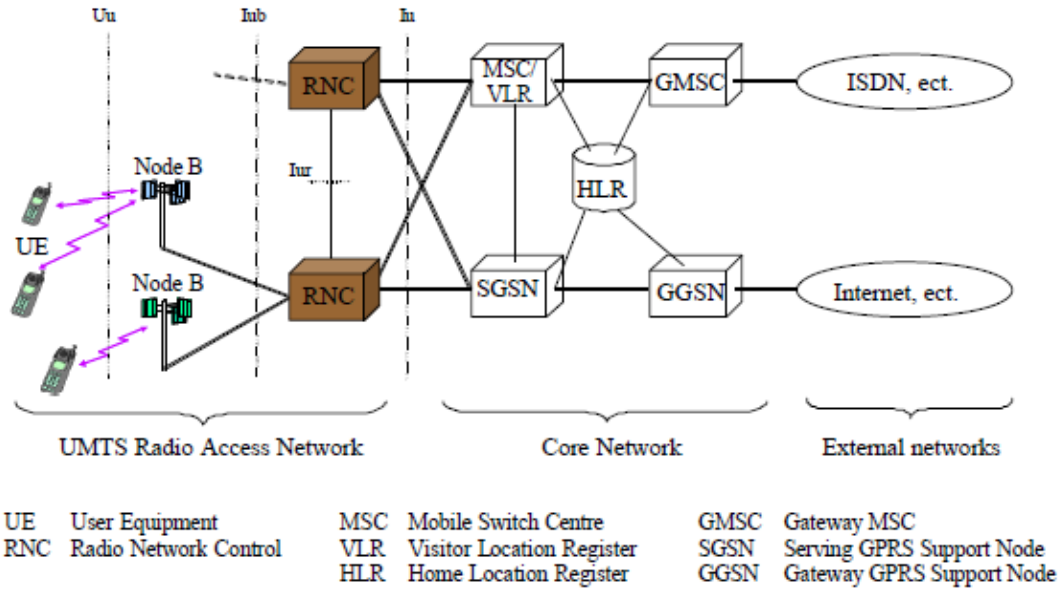


Figure 1. Network components of UMTS architecture ([ST01]).

39. The circuit switched part of the core network is the upper row (MSC/GMSC) connected to the telephone network, referred to in the diagram as ISDN. The packet switched part of the core network is the lower row (SGSN and GGSN) connected to the Internet. The core network connects to the UMTS RAN on the left. The units are the RNCs and the Node Bs. The air interface across which radio signals are sent is between the Node B and the User Equipment (UE).

40. UMTS itself had a MAC entity at the RNC. One of its functions, as part of the RLC, was to run an ARQ (Automatic Repeat Request) function to ensure that every block of data sent to the UE was received with integrity. This might involve repeated attempts to retransmit the same data.

41. In order for HSDPA to achieve the higher peak data rates and lower transmission latencies needed, the new dynamic resource allocation system was introduced. This involved a number of new elements. The main ones were as follows. An entity called the MAC-hs scheduler was introduced into the Node B. The "hs" refers to High Speed. The function of the MAC-hs was to carry out the new high speed dynamic resource allocation function, scheduling the data to be sent to the various UEs. The MAC-hs also ran its own ARQ process called Hybrid-ARQ or HARQ. By locating this process at the Node-B, the process was able to work more quickly and responsively than the higher layer ARQ process running at the RNC. One reason why the HARQ process of the MAC-hs is faster than the ARQ process of the MAC at the RLC is because of the smaller round trip time (RTT). When a UE detects that it has received an error free packet of data it can send an acknowledgement (ACK) back to the network. If the UE detects errors (maybe the packet it expected never arrived or it did arrive but has errors in it) then the UE sends a negative acknowledgement or NACK. The round trip is the time from the point of view of the MAC/MAC-hs between sending the block of data to a UE and receiving back an ACK/NACK so that it knows whether the block has to be sent again.

42. The data in HSDPA was to be sent on a new shared data channel, the HS-DSCH. The TTI was reduced from 20ms in traditional UMTS to 2ms. This allowed much more

fine grained control. As mentioned already, a control message was sent for every data packet on the HS-DSCH. This control message is called the HS-SCCH. The "CH" in HS-SCCH means channel and one can speak of HS-SCCH as a channel and as a message. The distinction does not matter in this particular context.

43. The way HSDPA works is that the UE continuously monitors the HS-SCCH channel for an HS-SCCH message directed to it. If the UE finds one, that means that on the HS-DSCH, in the next TTI, there will be a packet of data directed to that UE. The system also used channelisation codes to have 15 separate data channels in each TTI. So the HS-SCCH message also tells the UE what channelisation code(s) to use.

44. Thus whereas in a circuit switched system a channel would be dedicated to a user for the whole of a relevant interval, with HSDPA a large burst of data could be sent to a UE in a very short space of time, and then, once that was complete, the resources are freed up immediately and could be used to send another burst to another UE, and so on. The reason this facilitates web browsing for example, is because when a user accesses a web page that activity may require a large burst of data to be sent at the start, but once the data have arrived, no more data needs to be transmitted, at least for a while.

45. Another feature of the sort of data related to web browsing is that it can be intolerant of errors but tolerant of delays. In other words if errors are introduced that might mean that the webpage does not work at all, whereas, on the other hand, the system can afford to delay the transmission somewhat because all the delay causes is that a user has to wait a bit for the webpage to load. One can tolerate waiting for a short period as long as the result is that the page loads correctly. In the waiting period (unbeknownst to the user), the ARQ/HARQ error correction mechanisms may be working full tilt. These all introduce potential delays at the expense of ensuring fidelity in the data.

46. However some services on the internet are not "bursty" in nature. There are certain real time services which operate by generating small regular data packets, but are intolerant of delay. With VOIP the stream of digital voice data is transmitted as data packets at regular intervals over the internet. Compared with other kinds of internet usage, the data rates associated with voice traffic are low. Audio streaming and video streaming is similar (although the data rates are not necessarily quite so low). On the other hand this sort of traffic is intolerant of delays. The retransmission of failed packets via an ARQ process could well be noticed by a human listener and make the conversation difficult. Whereas the slight loss in fidelity caused by the corruption of a few packets is tolerable as audible interference.

47. The patents in this case presents their inventions as a solution to something referred to at trial as the "VOIP overhead problem". The problem is that given the significant amount of control data sent in HSDPA, with an HS-SCCH message sent for every data packet, this takes substantial resources relative to the low amount of data being sent. For example paragraph [0004] of the 177 patent itself states:

> "[0004] HSDPA and HSUPA are designed for high speed data and therefore the associated control overhead is not a problem when high data rates are used. When introducing for instance a relatively low bit rate VoIP or other real time service on top of

> HSDPA and HSUPA, however, the control overhead becomes a major problem. There are other types of services where this can be a problem as well."

48. HSUPA is the uplink (UE to Node B) version of HSDPA (Node B to UE). It is clear the concept of VOIP itself was part of the common general knowledge of the skilled team. I find that catering for VOIP over wireless networks attracted considerable interest at the priority date. However the question is whether the VOIP overhead problem itself was part of the common general knowledge. The defendants argued that it was, supported by Prof O'Farrell. Conversant argued that it was not. As will be explained below, this question is an important part of the obviousness case.

49. A related matter could be whether the common general knowledge included what you might call a *streaming* overhead problem, in other words the same problem but focussed on audio or video streaming rather than on VOIP. On the evidence before me, if the VOIP overhead problem was not part of the common general knowledge then neither did the common general knowledge include a known problem of the same kind for streaming services.

50. Prof O'Farrell maintained that to the RAN architect the VOIP overhead problem was common general knowledge. I have no doubt of the sincerity of his opinion, but the reasons in support of it were weak. No document was referred to by the Professor which supported his view. When he was asked about it in cross-examination Prof O'Farrell referred to two things. One was what he called the "sensitivities … in the trade off between control and data". I agree with Conversant's counsel that what his answer meant there was that he was inferring that the skilled person would know about the VOIP overhead problem because of the Professor's view of their common general knowledge about the need to reduce control information. I do not accept that as a basis for saying that the VOIP overhead problem itself was an item of common general knowledge. Even if thinking of it did follow readily from the application of the common general knowledge to a particular situation (e.g. prompted by considering VOIP) that is not the same thing as saying that the problem itself was part of the common general knowledge.

51. The other thing Prof O'Farrell referred to in answer to the question was the Bestak cited prior art. What he meant was that the idea would occur to the skilled person if they read Bestak. Bestak itself is not common general knowledge and I will address what the skilled person would think of when they read that document below. But even if the skilled person would identify a specific "VOIP overhead problem" when they were caused to think about putting VOIP on an HSDPA network, such as by reading Bestak, that is a matter to address in the obviousness section. It does not make the VOIP overhead problem itself common general knowledge.

52. In cross-examination of Mr Wiffen the defendants' counsel put a document to the witness as supportive of the point being common general knowledge. The document is technical paper 3GPP TSG-RAN WG1 #43 written by Qualcomm and presented to the relevant working group of the 3GPP standardisation committee dated 7-11th November 2005. That date is after the priority date and I was concerned about that at trial, but as the defendants' counsel pointed out, it was common ground that nothing changed in the common general knowledge between the priority date (April 2005) and the filing date (April 2006). Therefore the defendants were entitled to put it that way.

53. The document does refer to the VOIP overhead problem and Mr Wiffen accepted that the problem was taught in the document. However the fact a document shows the problem was known to some, even those working on the standard, does not mean it was common general knowledge. He said it did not represent the thinking of his skilled person (the layer 1/ layer 2 engineer) but I have not accepted that definition of the skilled person.

54. In my judgment this Qualcomm document does not prove that the point is part of the common general knowledge of the relevant skilled person. The fact that lead engineers in one group at the forefront of this technology had considered it does not reach the legal standard for common general knowledge.

55. However Mr Wiffen was also asked about whether Prof O'Farrell's skilled person had the problem as part of their common general knowledge and his answer was yes. The defendants, understandably, place heavy reliance on that answer.

56. Whether something is common general knowledge is not a question of primary fact, it is a question which involves the application of a legal standard to the facts. I do not believe I am precluded by Mr Wiffen's answer from reaching the conclusion that the VOIP overhead problem was not common general knowledge. I had a sense that Mr Wiffen was prepared simply to defer to Prof O'Farrell on the characteristics of Prof O'Farrell's skilled person. The only reasons given for the conclusion by Prof O'Farrell do not justify the conclusion, and neither does the Qualcomm document alone or in combination with Prof O'Farrell's reasons. Mr Wiffen agreed with Prof O'Farrell but that does not improve the lack of cogency of the reasons advanced to support the conclusion. Looking at the evidence as a whole, in my judgment the VOIP overhead problem was not part of the common general knowledge of the skilled person.

VAD

57. The skilled team knew about VAD (Voice Activity Detection). This is a feature of telephony which arises because of the pauses in human speech, both between words and in a conversation (when only one person is speaking). Rather than take up bandwidth sending the sound of silence all the way across a network, modern systems detect when a speaker is speaking and only transmit data when that is happening. When that is not being transmitted, the receiver can generate what is called comfort noise, so that the listener is reassured that the connection has not been lost.

The patents

58. Normally in a patent judgment the next step would be to review the patent specification in order to then construe the claims in context. In this case I will turn to the priority document instead and address its disclosure while at the same time deciding the priority issue relevant to the 206 patent. It is a convenient place to start anyway since the granted specification is almost identical. It also means that the analysis can be understood in its own terms without reference to a key aspect in which the priority document differs from the granted specifications.

Priority

59. The only live issue for the 206 patent is priority. The law is not in dispute and was summarised by Kitchin LJ in ***Medimmune v Novartis*** [2012] EWCA Civ 1234 at paragraphs 151-154. With an eye on this case, it is worth noting that the requirement under the 1977 Act is that the invention claimed is supported by the priority document (s5) and this has the same effect as Art 87 EPC that priority is given to the "same invention". Therefore the test is not only an enablement test although enablement is required and it is not only an added matter test, although adding matter is likely to lead to a loss of priority. A granted claim which is wider in scope than any claim or disclosure in the priority document may still be entitled to priority but to do that it must be supported by the priority document.

60. By closing the single ground on which claim 1 of 206 was said to lack priority was that the disclosure of the priority document is limited to a fixed time allocation whereby the mobile knows when to expect data, whereas the claim is not so limited. The claim clearly does cover the situation in which only the transport parameters are fixed and not the timing. One reason why that is clear is because the 206 patent specification corresponds to the 177 specification in that they both contain the passage which states (at col 6 ln 11 in paragraph [0023] of 177) that transport parameters must be fixed but fixing timing is optional. An important part of the defendants' argument is that this passage is not in the priority document. It was added later.

61. If this was an added matter case then one might note that claim 1 of 206 could be said to cover something but not disclose it – but the test is not only one of added matter, as I have explained above. Claim 1 certainly covers the situation in which timing is not fixed and only the transport parameters are fixed.

62. The arguments on this were exceptionally elaborate but in my judgment the position is really not that complicated. The priority document starts with a reference to VOIP and other real time services for HSDPA and HSUPA. There is then a section called "Discussion of Related Art" which starts with the paragraph introducing the VOIP overhead problem which I have quoted above in the common general knowledge section. The next section is called Disclosure of Invention at p2. It is followed by the section giving a brief description of the drawings. It is worth setting out the Disclosure of Invention section in full:

> "In order to reduce the HS-SCCH overhead, fixed time allocation approach could be used to reduce the HS-SCCH overhead. In that case, the scheduling time of each VoIP user is semi-static and thus there is no need to transmit HS-SCCH for the first transmissions, if the user knows when to receive data on HS-DSCH and what the used transport format is.
>
> There are several ways implementing this:
>
> 1) HS-SCCH/E-DPCCH signalling to indicate parameters of first transmission, subsequent transmissions use same parameters (and HS-SCCH/E-DPCCH sent only when changes needed)
>
> 2) fixed allocation, RRC signalling used to allocate users and tell the default transport parameters

> In the Best Mode Section below, we mainly describe the first alternative.
>
> Advantages: HS-SCCH transmission could be avoided in many cases. This requires that BLER target is low enough for the initial transmission (10-20%), since we assume that retransmission always use HS-SCCH. In favourable conditions (a lot of same size VoIP packets), up to 80-90% of the HS-SCCH transmissions could be avoided.
>
> The savings in HS-SCCH overhead depends on
>
> • How often re-transmissions are needed (PER target)
>
> • How often the size of the VoIP packet changes
>
> • How often SRB needs to be transmitted
>
> • How often we want to change the used transport format
>
> Disadvantages: some new RRC signalling, a bit more complexity for the UE (to decode max four HS-SCCH and in addition try stored parameter values)."

63. The first sentence refers to the objective of reducing HS-SCCH overhead and is explaining that a fixed time approach could be used. The point is that if the user knows when to receive data and what the transport format is, then there is no need to transmit HS-SCCH for the first transmissions.

64. The rest of the first paragraph explains that in that case the scheduling time for each user is semi-static and thus there is no need to transmit HS-SCCH messages for the first transmissions. First transmissions is understood as being first as opposed to retransmissions. Although the text here refers to VOIP it is clear overall that the disclosure is not limited to VOIP.

65. The next line states that there are several ways of implementing "this" and is followed by two alternatives – 1 and 2. Alternative 1 is about reusing stored control information obtained from previous packets and alternative 2 is about using default parameters set by higher layer signalling. The alternatives are described in more detail further on, mainly focussing on alternative 1. At the end of the Disclosure of Invention section advantages and disadvantages are set out. The defendants sought to make something of the fact that if Conversant was right about the disclosure then there would not be just a "bit more complexity" for the UE but a lot more and a drain on battery life. I reject that approach to construction. The skilled reader would not draw any such conclusion either way.

66. Conversant suggested that "this" in the introductory words to the alternatives meant the reduction of overhead rather than the fixed time allocation, and so the remaining disclosure was not limited to fixed time. I do not accept that. All a reader would think "this" referred to was what had gone before. There would be no reason to think

the language was trying to draw a distinction between the invention and the use of a fixed time allocation to reduce overhead.

67. One of the figures in the priority document is figure 6, which is a clear description of a periodic approach (i.e fixed time). In the Brief Description of the Drawings section, the text for figure 6 describes it as "showing the basic concept and periodicity". One suggestion seemed to be that this meant that there was a difference between the "basic concept" on the one hand and periodicity on the other. I do not agree. No terms of art are involved here. The skilled reader would not think this wording told them anything about whether time had to be fixed or not.

68. The next section (from page 4 onwards) is a detailed description of what the document calls the "Best mode for carrying out the invention." There is a passage at p5-6 which relates to figure 4 (figure 4 is discussed below relating to claim construction). The passage is written referring to a fixed allocation without in words spelling out what does or does not have to be fixed. This does not refer to timing (or transport parameters) at all. It is no more than neutral. It does not positively teach that timing need not be fixed.

69. A description of alternative 1 starts at p6 and runs to p9, then there is a brief description of alternative 2, followed by some general disclosure. Nowhere in this text is there any statement that timing need not be fixed and there are clear examples in which timing is fixed. For example alternative 1 includes two options and the second option within alternative 1 clearly has fixed timing (page 7 ln 11 refers to periodicity parameter T). Another example is alternative 2 which also refers expressly to periodicity (p9 ln15). Conversant suggested the use of the word "could" in the relevant sentence meant it was optional. I do not agree. Read as a whole it is not optional. It is part of what is being described for alternative 2.

70. However it is true that in other parts of the document there is no express reference to fixed timing or to periodicity. Conversant contended that there was no fixed timing of any sort in alternative 1, first option. Their case was supported by the evidence of Mr Wiffen. However his evidence on what the priority document disclosed was thoroughly unconvincing. He managed to read an entire elaborate scheme into the priority document, involving the need to store control information for normal packets. There is not a word about that in the document and I reject it. As the defendants submitted, there is really a single inventive concept disclosed in the priority document which is that as long as the mobile knows when to expect data and what the transport format is, control information need not be sent for each fixed allocation data packet and so control overhead can be reduced. Two ways of doing this are disclosed – reuse of stored HS-SCCH control information from previous *fixed* allocation packets (my emphasis) – that is alternative 1, and default values based on higher layer signalling (alternative 2).

71. It is true that figure 5 assumes the UE can distinguish between fixed and normal packets and does not spell out such a step, either before "enter" or after it – but even if the skilled reader noticed this at all (and I am doubtful) they would realise that the mobile would distinguish fixed and normal packets based on the timing of their arrival.

72. Conversant criticised aspects of Prof O'Farrell's approach and what they called a need for an absolute timing approach. I do not need to get into that in order to find, as I do, that the priority document does not disclose to the skilled reader anything other than an approach in which the user knows when to receive the relevant data, in other words a fixed time allocation approach. That is the limit of the disclosure.

73. Just because the priority document is limited in that way does not necessarily mean that a claim which is not so limited must lose priority. The question of support still needs to be asked and answered. However when it is asked, in my judgment the answer is clear. The difference between the scope of claim 1 of 206, in covering a case in which timing is not fixed, is materially wider than the disclosure of the priority document and relates to a different concept. What would be required to implement it is different and its effects would be different too. It is not the same invention. It is not entitled to priority.

74. Therefore the 206 patent is invalid.

The specification of the granted patents

75. It is convenient to work from the 177 specification. The others are materially identical. Most of the 177 specification is the same as the priority document with the important extra passage at col 6 ln 11-15 in para [0023] which states that transmission parameters always have to be fixed while timing may or may not be. The same alternatives 1 and 2 are disclosed along with the same two options for alternative 1.

Claim construction

76. The legal principles are familiar and not disputed.

77. Most of the arguments about construction are so closely tied to arguments about other issues that they are better seen in that context. However the main argument, about what "fixed allocation" means, can be dealt with now.

Fixed allocation

78. Claim 18 of 177 draws a distinction between fixed allocation data packets and normal data packets. They are both carried on a shared data channel which is itself associated with a shared control channel. This is all in feature 18(b). The fixed allocation is referred to again in features 18(c) and 18 (d). It also appears in the same way in claim 35 of 177 (claim 35 (b), (c) and (d) but is also in 35(e) and (f)). It also appears in claims 1 and 13 of 722. The term has the same meaning in all these claims.

79. Conversant's primary case was that the term fixed allocation in the claim necessarily incorporated a limitation that control information was sent only for selected packets within the fixed allocation, which meant not every packet. The defendants did not agree and argued that the concept of only sending control information for selected packets was not part of the definition.

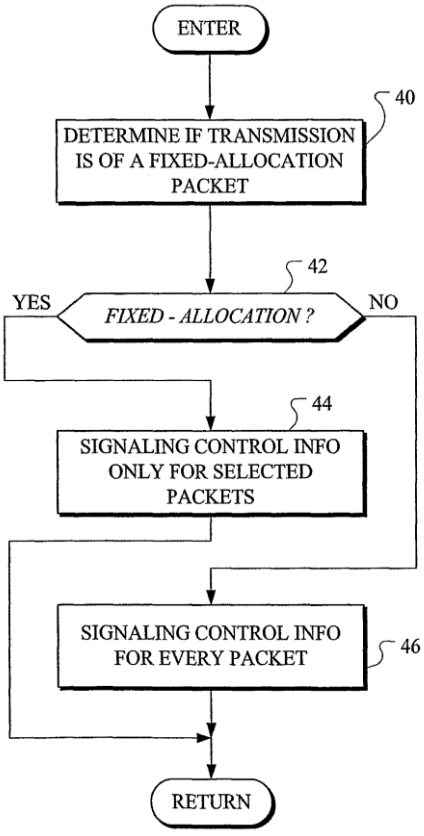
80. Starting simply with the words themselves, the reader would understand that this expression is talking about a fixed allocation of timing and/or transmission parameters. In fact, given the passage at col 6 ln 11-15 in [0023], transmission

parameters always have to be fixed while timing may or may not be, but that is not germane at this stage. It is convenient to think of this as a fixed allocation of resources although not all transmission parameters are always regarded as resources.

81. The words "fixed" and "allocation" individually or together are not terms of art. Nothing about the phrase read in isolation conveys the idea of a requirement that control information be not sent.

82. Moreover the prior art Bestak demonstrates that there is no necessary link between these ideas at a technical level. I do not mean Bestak itself would play a part in the skilled reader's thinking. The point is simply that Bestak shows it is possible to have a fixed allocation without only sending control messages for selected data packets.

83. The correct approach of course is not to read the words in isolation but to understand what the inventor was trying to convey in the context of the specification as a whole. This takes one to the structure of the individual claims and, in the specification, to figure 4 and paragraphs [0023] and [0024]. Figure 4 is a flow chart, as follows:



84. The specification explains this is a flow chart which may be executed by a signal processor in a UE or a Node B. Paragraph [0023] then explains that:

> "The method illustrated by the flow chart is for use in a device of wireless telecommunications system, […] for signalling control information on a signalling channel of a radio interface […] said control information concerning transmission of packets on a shared data channel carrying both packets for

> which a fixed allocation is configured and normal packets without fixed allocation."

85. The point here is that the shared data channel is going to carry two streams of data packets – fixed allocation packets and normal packets. The latter do not have a fixed allocation.

86. Paragraph [0024] with the sentences separated out is as follows:

> "The method may include a step 40 of determining if the transmission of packets is for fixed allocation packets.
>
> If such is determined to be true in a step 42, a step 44 is executed to signal control information on the signalling channel but only for selected packets.
>
> This avoids excessive signalling of the control information for every small packet.
>
> Thus, if a normal packet is to be sent, as determined in the step 42, the control information is signalled for every such normal packet, as shown in a step 46.
>
> The fixed allocation principle would in practice be configured for one or more logical channels or MAC-d flows.
>
> Thus this invention would only be applied for packets sent on these logical channels or MAC-d flows.
>
> Here we call those packets 'fixed allocation packets' and the other packets 'normal packets'."
>
> [*non-limiting examples follow*]

87. This explains that in practice the fixed allocation principle is configured for one or more "logical channels" or "MAC-d flows". The skilled reader would understand those terms as effectively synonymous. What they refer to is a distinct data stream. Thinking of the downlink, one logical channel could be a data stream associated with the audio signals going to a phone in a VOIP telephone call and another logical channel could be the data stream associated with email being downloaded onto a phone. These logical channels are real in terms of the way the computer signalling works, but they are different from a lower layer channel such as the radio frequency band. One of the strengths of the protocol layer stack concept is that one can think of communications between peers in a network via logical channels which exist at a higher layer of abstraction from the lower layer channels by which data may be conveyed.

88. What this part of the specification does make clear is that "fixed allocation" is a characteristic of a logical channel, in other words a stream of packets. It is the channel itself which gets the fixed allocation of resources. Although one can therefore speak of the fixed allocation applying to packets – as the claim does – those packets are all in the same logical channel. Of course there could be multiple distinct

logical channels with their own fixed allocations but that is not the issue. Equally the "normal packets" are packets sent on other logical channels. Consistent with this, at the end of paragraph [0024] some non-limiting examples of fixed allocation and normal type packets are set out. Again although the word used is packet, the reader would understand this to be referring to a logical channel. The fixed allocation examples are delay sensitive packets. The examples of normal ones are delay-insensitive packets.

89. This aspect of claim construction, that the fixed allocation refers to a logical channel, is not really in dispute. The dispute is about whether or not one can read in the idea of not sending control messages sometimes, which is after all the core idea in the invention.

90. The argument is that even if the words "fixed allocation" on their own do not convey the idea of a requirement that control information be not sent, the seventh sentence in paragraph [0024] imports the requirement in the form of a definition. I do not accept that. The patent contains a clear teaching of the idea of only sending control information for selected packets in the fixed allocation. That is not in dispute. However it does not follow from that that the skilled reader would understand this to be a requirement imported by those words. What the sentence is simply doing is explaining that a packet in a logical channel to which the fixed allocation principle is applied, is called a fixed allocation packet.

91. Before going any further however, I will take a step back.

92. Conversant presented its case starting with claim 18 of 177. What puzzled me about Conversant's case on this claim is how unclear it appeared to be whether the claim actually contained the core feature of the invention at all (the core feature being not sending control information – see below). In the end I found it helped to go back and start with claim 1, even though it rarely figured at the trial. The point is not about how many claims are asserted as being infringed, rather this is an example of why it really is the right thing to do to read a document as a whole.

93. A common problem is that inventions do not always lend themselves to simple claim drafting. Aside from satisfying the laws relating to validity, in practice a good patent claim has to do two different things. It has to define the invention, but it also has to do that in a way which allows the inventor to have worthwhile rights. The patent system exists to provide temporary economic rights to inventors as the reward for disclosing the invention to the public. A perfect definition of the invention is no use if it would not be infringed by persons taking advantage of that invention. An example of this problem is the difficulties which have arisen in framing claims and defining infringement relating to inventions which are the second medical uses of known drugs (see ***Warner Lambert v Generics*** [2018] UKSC 56).

94. Another situation in which difficulties can arise is with inventions concerning activity on networks like the internet and cellular systems. The problem is that these systems involve multiple distinct elements which have to interact in a particular way. A patent claim to the network as a whole can be a good way of defining the invention but be of little practical utility because no-one sells the whole thing. The law of "means essential" infringement under s60(2) of the Act may or may not help in a given case. That is why Conversant have focussed on claim 18. It is a claim to a handset (mobile

station). These are items with significant economic value. One can define infringing acts relating to them, pay royalties based on their sales and so on.

95. Nevertheless, just because these problems are real enough does not mean that the patentee is entitled to some special dispensation in terms of the legal approach. The defendants rightly drew attention to the structure of the claims as a whole and noted that they could be categorised into four groups – methods of transmission, methods of reception, elements of RAN infrastructure (such as a Node B) which transmit to mobiles, and mobile stations configured to receive signals (mobile stations). Claim 1 is in the first category and claim 18 is in the fourth category. The defendants put it this way in opening:

> "147. The approach to claim drafting has been to mirror the features of the transmission or reception method claims in the claims to network elements and mobile stations. However, the consequence of that approach is that a process feature which is a positive requirement of one of the method claims may not actually be a limiting requirement of the product claims to a mobile station configured in a certain way. The skilled person would not strain to make every feature of the language of the product claims have a limiting effect, because they would appreciate that those claims were part of a set of claims also covering methods of transmission and reception, and the language of the product claims had been chosen simply to match that used in the corresponding method claims. "

96. I agree with the first two sentences. The third sentence is advocacy but I do agree that the reader would appreciate the claims are part of a set, with matching language, and read them accordingly.

97. One problem with the core feature of the invention is that it is defined by not doing something. That can be tricky anyway but there is another difficulty because in HSDPA the mobile station (of claim 18) is a receiver, not a transmitter. Not receiving something is not the same as not transmitting it. After all a receiver may not receive a message, not because it was not sent, but because of reception problems such as interference (see e.g. Bestak below).

98. Starting at claim 1 is helpful because it defines how the whole thing works. It is a general method involving both the transmitter at the land side (the radio access network) and the mobile receiver (the mobile station), as follows:

> 1[a] A method comprising:
>
> 1[b] signalling first control information on a shared control channel from a radio access network to a mobile station (UE1, 10) for use in processing data packets transmitted on an associated shared data channel carrying both fixed allocation data packets, for which a fixed allocation is configured, and normal data packets without fixed allocation , and wherein the first control information comprises transmission parameters,

> the transmission parameters comprising a modulation and coding scheme used on the shared data channel;
>
> 1[c] transmitting a first data packet to the mobile station (UE1, 10) on the shared data channel using the transmission parameters of the first control information, the first data packet being in a said fixed allocation;
>
> 1[d] for at least one subsequent transmission on the shared data channel in the fixed allocation, signalling control information to the mobile station (UE1, 10) on the shared control channel, the control information comprising one or more different transmission parameter values, only if one or more transmission parameter values for said at least one subsequent transmission differ from one or more corresponding values used for transmitting the first data packet; and
>
> 1[e] indicating to the mobile station whether the transmission parameter values of the control information signalled for said at least one subsequent transmission should be stored by the mobile station.

99. Features 1[b] to 1[e] correspond closely to feature 18[b] to 18[e] but they are not identical.

100. Feature 1[b] is concerned with the RAN transmitting "first control information" to a mobile station on a shared control channel. The first control information is for use in processing data packets transmitted on a shared data channel. The plural (for use in processing data packets) may not be an accident in that it might suggest that the first control information will be applicable to multiple packets, but putting weight on that strikes me as inappropriate meticulous verbal analysis. Feature 18[b] corresponds to 1[b] but talks about the mobile being configured to receive first control information.

101. The way the fixed allocation and normal packets are referred to in 1[b] is the same as in 18[b].

102. Feature 1[c] relates to transmitting a first data packet using the transmission parameters of the first control information. Again feature 18[c] corresponds to it in the same way as 18[b] corresponds to 1[b].

103. The first words of feature 1[d] are "for at least one subsequent transmission on the shared data channel in the fixed allocation". This refers to the transmission of a later packet of data from the same fixed allocation logical channel as the first data packet. Feature 1[d] then requires that control information is signalled only if one or more transmission parameter values for the later packet differs from the value used for the first data packet. This is the core feature of the invention described in the specification. In terms of HSDPA it requires that for at least one later packet sent on the HS-DSCH the transmitter will only send an HS-SCCH control message for that later packet if something has changed. So if nothing changes, no HS-SCCH control message will be sent for that later packet associated with a particular logical channel.

The idea of not sending a control message like this works because for that logical channel there has been a fixed allocation of transmission parameters.

104. Note that the claim is not quite as narrow as it looks, because the reference to "at least one" subsequent transmission means that the system could also transmit control messages even if things have not changed, as long as there is "at least one" occasion when it does not do that, and only sends a control message if things have changed.

105. Aside from the point in the previous paragraph, the terms of feature 1[d] have the important consequence that at least in claim 1 there is no need to read the core feature of the invention, of not sending control information, into the words "fixed allocation". The feature is spelled out expressly.

106. However now the correspondence with claim 18 is tricky. Feature 18 [d] refers to the mobile device being configured to receive control information only if transmission parameter values differ. At least at first sight that does not make a lot of sense. One thing it does not mean is that the mobile is configured so that subsequent control information would not be received unless it differed in some way from previous control information. Conversant's case, supported by Mr Wiffen (to the extent he had relevant evidence to give), is that in effect feature 18[d] just means that the mobile has to be able to receive a control message sent in the circumstances described in claim 1. The defendants contended for the same construction of this feature and I accept it. The result is that in claim 18, feature 18[d] is not much of a limitation as compared to known mobile phones configured to receive HSDPA. They are all configured to receive HS-SCCH control messages irrespective of whether the transmission parameters have changed or not. On the other hand in claim 1, feature 1[d] is a departure from normal HSDPA.

107. Finishing claim 1, the last feature is 1[e]. The feature refers back to the control information sent at 1[d] and requires there to be an indication to the mobile whether to store those values. Claim 18[e] corresponds to this in the same way features 1[b] and 18[b] correspond. There is an issue about what amounts to an indication but that does not depend on the comparison between claim 1 and claim 18 and I will deal with it separately below.

108. Before getting to the end I need to mention Prof O'Farrell's evidence. He attached significance to the position of box 40 in figure 4 and its corresponding box 40a in figure 9. In fig 9 the box is called the "fixed/non-fixed allocation determiner". Prof O'Farrell's view was that to a skilled reader this aspect of the patent (including the description) showed that the classification of a logical channel as a fixed allocation channel or not was disclosed as taking place before the filter (fig 4 box 42) which separated them out so as to end up sending only selected control information with one stream but not doing that for the other (normal) stream. Therefore his view was that the property of being a fixed allocation logical channel had to be inherent to that channel. It is a classification of the channel based on the characteristics of the traffic in it, such as delay sensitive or not, and high or low bit rate.

109. I accept the Professor's point to the extent that fixed allocation is indeed a property of a logical channel, but I do not accept that the reader would think the patentee meant to say that as a matter of definition, only logical channels with traffic which had certain specific characteristics (undefined) qualified as fixed allocation channels. The

patentee has given the implementer the freedom to decide what sort of logical channels will be given a fixed allocation. That is as far as this point goes.

110. It has taken a while, but the debate about fixed allocation is a fundamental point. In my judgment "fixed allocation" does not carry with it a limitation that only selected control information must be sent. On the contrary, to use the well worn phrase, fixed allocation means what it says. It refers to a fixed allocation of something, in this case resources.

111. This then raises Conversant's fallback argument. As a fall back to its case that fixed allocation required not sending control information, Conversant contended as follows: the fixed allocation requires some positive act of allocation by the network of transport parameters (and optionally time); it would not be satisfied by a system where the parameters just happened to be constant. This fall back arose at the end of the closing submissions. It is advanced with a firm eye on the Bestak prior art. The defendants' response to it is first that the patent is very clear that transport parameters do change. The claims (18 and claim 1 too) expressly provide as much. The defendants' second response is that from the point of view of the mobile, there is no difference in its configuration arising from the reason why packets are emerging from the Node B with the same transport parameters. In other words it is the same if they just happen not to change as it would be if they had been positively fixed.

112. I accept Conversant's fall back submission. The skilled reader would know that in the normal UMTS and HSDPA, many data packets will be sent for which the transport parameters for one packet happen to be the same as the next packet and so on. Successive packets could also be sent in TTIs which happen to come periodically. This is not what the patentee is using the words fixed allocation to refer to. It would be understood to involve some act of allocation of the transport parameters (and optionally time) to the relevant logical channel. The fact that the resources allocated to that logical channel can or will change in future does not mean they were not positively allocated in the first place.

113. Therefore I do not accept the defendants' first response as a point against the construction. The defendants' second response is not actually a reason for not construing fixed allocation in that way. What it may be is a reason why that construction, when applied to claim 18 and considered in the context of the prior art, does not give novelty, but that is a different issue and will be addressed in context.

Receiving both fixed and normal packets at the same time

114. Feature 18(b) refers to a shared data channel carrying both fixed allocation and normal data packets. Conversant contended that this meant that the mobile has to be able to receive both kinds at the same time. To the contrary the defendants contended that it just meant that the shared data channel had to be able to carry fixed allocation data packets for one mobile and normal packets which could be for another mobile altogether. The significance of this debate is about the prior art because Conversant contends that the relevant prior art Bestak only discloses the latter (fixed to one mobile, normal to another) and not the former (both fixed and normal to the same mobile at the same time).

115. The specification clearly describes the idea of the co-existence of fixed and normal packets related to the same mobile being sent at the same time. This is on the uplink (see paragraph [0023] and fig 4). Although it is disclosed expressly relating to the uplink, the reader would understand that the idea of coexistence was just as applicable to the downlink, and so the skilled reader would not be surprised if it was claimed. But that does not mean the words used in the claim do actually claim it. The defendants say they do not. Conversant's best point is that in the claim, from the point of view of the mobile, there is no point in mentioning normal data packets at all unless they are destined for that mobile. This is a close call but I accept the point. It is supported by reading the document as a whole and in particular by looking at claim 1. Claim 1 is concerned with signalling from the RAN to a mobile station. It is not describing signalling to mobiles in general. In that claim feature 1(b) uses the same language as 18(b), referring to fixed and normal packets – albeit in the context of transmission. As the skilled reader would read claim 1, the fixed and normal packets are being transmitted to a mobile station, which the reader would take to be the mobile station claimed in claim 18.

116. The claim does not mean that the fixed and normal packets have to be received precisely simultaneously, what it means is that the mobile has to be configured to be able to receive the two logical channels, one with the fixed allocation and one with the normal allocation, at the same time.

Novelty and Inventive step

117. The single item of prior art relied on is Bestak. I will start by addressing the disclosure of the document itself, then deal with novelty and then obviousness.

The disclosure of Bestak

118. The Bestak thesis is focussed on UMTS in general and HSDPA in particular. It is concerned with reliable data transfers. The thesis sets out various proposals in that field, some of which are supported by computer modelling. A particular focus of the work is on ARQ protocols and on the RLC layer, on the TCP (a control protocol) and on the MAC-hs scheduler.

119. In the introductory chapter, chapter 1, there is a section entitled "UMTS QoS Classes". In it Bestak classifies various different "services" which may use the UMTS system. A service could be internet browsing or audio streaming. Bestak explains that different services have different requirements in terms of characteristics such as wireless delay and bit error rate. Bestak explains these services are grouped into four "traffic classes" and summarises the features of these classes in Table 3, which is set out below. Bestak notes that the main distinguishing factor between the various classes is how sensitive they are to delay. None of this is surprising to the skilled person. It is common general knowledge. Table 3 is as follows:

Traffic class	Conversational	Streaming	Interactive	Background
Characteristics	Preserve time relation (variation) between information entities of the stream Conversational pattern (stringent and low delay)	Preserve time relation (variation) between information entities of the stream	Request response pattern Preserve data integrity	Destination is not expecting data within a certain time Preserve data integrity
Mode	Circuit	Circuit, Packet	Packet	Packet
ARQ		MAC-hs	MAC-hs, RLC TCP	MAC-hs, RLC TCP
Example	voice	audio, video streaming	web-browsing	SMS, MMS

Table 3. UMTS QoS classes (inspired by [3G23107]).

120. With an eye on the issues in the case, it is notable that the first class named "conversational", which is what would be traditionally called a telephone service, is classified exclusively in the circuit mode and not the packet mode. HSDPA was not a feature relevant to circuit switched signals. The idea that this voice traffic is not tolerant of delays is referred to. There is no express reference to VOIP here. The term does not appear in Bestak at all.

121. Audio and video streaming is the second class in the table. The text of the thesis bridging pages 11 and 12, and the table, refer to both the conversational and streaming classes as delay sensitive, with conversational being the most delay sensitive UMTS QoS class and streaming being less strictly sensitive to delay. In terms of streaming services, Bestak describes the advantage of the faster HARQ process of the MAC-hs (due to a lower round trip time (RTT)) compared to the slower ARQ process at the RLC (with a larger RTT). The passages ends with:

> "Compared to MAC-hs RTT, the RLC RTT is longer. The use of ARQ of RLC would introduce much more important radio delay than MAC-hs does. Therefore, the ARQ of RLC should be avoided for streaming services. We will return to streaming services when studying the HSDPA allocation mode (section 5.3)."

122. The section 5.3 referred to is in the chapter of Bestak concerning HSDPA and is the main part of the thesis relied on by the defendants for obviousness.

123. Prof O'Farrell's view was that the skilled person would have the VOIP overhead problem in mind when reading this section, and the last sentence in particular. I have not accepted that. It was not common general knowledge. I will address what might come to the mind of the skilled person reading Bestak below.

124. The remainder of this section 1.4 of Bestak deals with interactive and background traffic classes such as web browsing and text messaging. These are tolerant of delays but require data integrity to be preserved. The skilled person would understand that.

125. The rest of Chapter 1 explains the structure of the thesis as a whole. A relevant passage is at page 14, as follows:

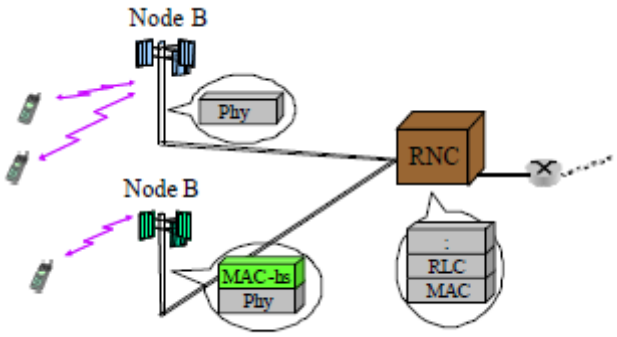
> "The HSDPA mode introduces a third hybrid ARQ mechanism at the physical and MAC-hs layers. Besides the HARQ mechanism, HSDPA brings several other features such fast scheduling or fast link adaptation through MCSs (Modulation Coding Scheme). Majority of the HSDPA studies cover HSDPA link adaptation, performance of Error Correction Codes or HSDPA scheduling issues ([NA02], [DK02a], [KF02b]). HSDPA features make possible to it for streaming services; the HSDPA performance for streaming services is analyzed in [M02]. Nevertheless, streaming services do not need such dynamic allocation that HSDPA offers. This type of services generates regularly outgoing data and such data flows postulate a periodic allocation. Our work discusses impact of periodic allocation on the dynamic allocation mode and on the HSDPA signaling."
>
> [my emphasis]

126. The underlined passage would be seen by the skilled person as a new idea. Read in the context of what has gone before, the idea is that the dynamic resource allocation in HSDPA is not needed for streaming services because of their traffic characteristics. Instead a "periodic allocation" is proposed.

127. No hindsight is involved in skipping over the intervening chapters and turning to chapter 5, entitled "High Speed Downlink Packet Access in UMTS". The introduction section 5.1 describes HSDPA and its features. The passage includes the following, which makes a similar point to the point made in chapter 1 about streaming services not needing dynamic allocation, and introduces Bestak's new idea of a "periodic allocation" of resources for services such as streaming services:

> "The HSDPA allocation mode makes possible to reallocate radio resources very fast among the users; basic facts about the mode is depicted in section 5.3.1. However, services such as streaming services do not need such dynamic allocation of HSDPA resources. Section 5.3.2 discusses periodic allocation and its impact on the dynamic allocation. Simulation experiments concerning the dynamic and periodic allocation are described in section 5.3.3. The HSDPA allocation studies are concluded in section 5.3.4."
>
> [emphasis added]

128. Bestak summarises the layer modifications which the introduction of HSDPA makes to UMTS, starting with figure 29:



129. Next the shared HS-DSCH data channel, and the HS-SCCH control messages are described along with the 2ms TTI and the 15 channelisation codes. There is a discussion about HARQ instances at 5.2.3. HARQ instances are distinct HARQ processes running at the same time as one another, each concerned with a different data packet. This mitigates the delays caused by the "stop and wait" (S&W) approach because without multiple HARQ instances one would have to stop and wait for an ACK or NACK for a given packet before sending the next packet.

130. Section 5.3 is Bestak's study of the HSDPA allocation mode. The benefits of HSDPA and the need to reliably decode HS-SCCH control messages are summarised in 5.3.1 as follows:

> "The HSDPA allocation is very flexible due to the reduction of the basic allocation period from 10 ms (Release 4) to just 2 ms (one T-slot). HSDPA users are assigned T-slots according to a scheduling algorithm that is implemented at the MAC-hs layer. Short duration of the allocation period allows the scheduler to reallocate shared radio resources very quickly. The scheduler can assign in a T-slot up to 15 channelization codes, which may be shared either among several UEs or they are all assigned to just one UE.
>
> A fast reallocation of resources produces a fast variation of scheduled UEs in time. Information about UE(s) that is allocated resources in a given T-slot is carried in HS-ShCoCH(s). This means that the UE has to firstly correctly decode the downlink-signaling message in order to correctly decode data on the physical data channels (HS-PDoShCHs). If a UE misses or incorrectly decodes the signaling message, the UE misses as well as data on HS-PDoShCHs. To minimize HSDPA losses, it is very important to design a good HS-ShCoCH coding scheme. A performance comparison of different coding schemes for HS-ShCoCH is done in [DK02a]."
>
> [*In Bestak HS-ShCoCH refers to what is called HS-SCCH in this judgment and HS-PDoShCH refers to the physical HS-DSCH.*]

131. This is common general knowledge.

132. Next Bestak considers round trip times and certain UE characteristics – the number of channelisation codes a UE can receive in one time slot and the minimum interval between the beginning of a TTI and the beginning of the next TTI which a UE can support. Bestak reports the results of some simulations relevant to his analysis (figures 36 and 37). One point is to show how rapidly the scheduler can reallocate resources.

133. Bestak's periodic allocation mode is described at 5.3.2 on page 90. Again the thesis makes the point that streaming services do not need dynamic allocation and so a periodic allocation mode to coexist with dynamic allocation is proposed:

> "The previous example illustrates how rapidly the scheduler can reallocate radio resources for different system parameters. Reference [M02] investigates the HSDPA performance for streaming services. However, audio or video streaming services do not strictly require such a dynamic allocation of HSDPA resources. Streaming services generate regularly outgoing data. Such data flows postulate a periodic allocation of T-slots with a constant period instead of the dynamic allocation. We propose to introduce a specific allocation denoted as a periodic allocation that is more suitable for streaming or broadcast services. In this mode, radio resources are allocated periodically with a constant period. This period is set up when (re)configuring the radio bearer. A value of the constant period is determined according to the reserved rate for the given radio bearer. The proposed allocation mode can still coexist with the dynamic allocation."
>
> [emphasis added]

134. The last sentence, just after the underlining, refers to coexistence. I will come back to that in the Novelty section below. The underlined passage explains that the periodic mode involves allocating radio resources with a constant period configured using higher layer signalling (the reference to the radio bearer). This is explained as follows:

> "Within the periodic allocation, a UE waits for data in its "reserved" T-slots. Hence, the UE knows in advance when to expect data prior to receiving and decoding the downlink-signaling message (HS-ShCoCH). If channel conditions are steady, the UE does not necessarily need to correctly decode the associated downlink-signaling message in order to decode data on the HSPDoShCHs. In such situation, the UE may employ a "blind" detection and reutilize signalling information from the previously correctly received downlink-signaling message. Figure 34 shows that for certain system parameters the UE does not theoretically even need to know the HARQ Id since just one S&W process is active. The knowledge of the next assigned T-slot makes the periodic allocation more robust to errors occurring on the downlink-signaling channel in comparison with the dynamic allocation."

135. In effect the system reserves a periodically recurring T-slot for a given UE. As the skilled person would understand, what this passage is explaining is that because the allocation is periodic, the result is that the UE knows when it is supposed to receive a packet for it on the HS-DSCH. Accordingly, if nothing has changed since the successful receipt of a previous pair of an HS-SCCH control message and a corresponding data packet, the information in the previous HS-SCCH control message would be applicable for use in decoding a subsequent data packet. Therefore even if the UE fails to decode the subsequent HS-SCCH message associated with the subsequent data packet, it could still decode the subsequent data packet by using the control message information from the first HS-SCCH control message, which would have to have been stored. As Bestak emphasises at the end of that passage, this shows that knowledge of the next assigned T-slot makes the periodic allocation more robust to errors in downlink signalling. The downlink signalling errors this refers to are errors which cause failures to decode subsequent HS-SCCH control messages. The point is that even if those control messages are not decoded, the UE may still be able to receive the subsequent data packets successfully by reusing earlier control information.

136. The next passage (still on page 90) is as follows:

> "If a UE is not assigned radio resources in its reserved T-slot (e.g., due to lower data rate or higher priority services), the UE has to be informed about it. This notification can be provided, by setting up a flag (1 bit) in HS-ShCoCH that would be dedicated to such an event."

137. This passage attracted some controversy. I will come back to it in context.

138. Then after dealing with the possibility of modification of the fixed allocation period, Bestak turns to simulations of the periodic allocation. These involve two types of service – background and streaming. The former are the services Bestak has already identified as being the least sensitive to delays. The conclusion, which is expressed in section 5.3.4, is that a compromise has to be made between error sensitive services (e.g. background) and delay sensitive services (e.g. streaming). This section includes another explanation of the periodic allocation approach, as follows:

> "In the periodic allocation, the UE knows in advance when to expect data on HS-PDoShCHs prior to receiving and decoding the downlink-signaling message (HS-ShCoCH). Thus, the UE does not really need to correctly decoded HS -ShCoCH in order to decode HS-PDoShCHs. This feature makes the periodic allocation more robust to errors on the downlink-signaling channel (HS-ShCoCH) in comparison with the dynamic allocation."

139. Chapter 5 of the thesis then moves on to discuss a different idea, concerning the idea of modifying the size of MAC-hs PDUs for HARQ retransmissions as a form of link adaptation in changing radio channel conditions. There is no need to get into that.

140. Chapter 6 of the thesis summarises conclusions and perspectives. The content of this chapter does not add anything to the questions I have to decide.

Novelty over Bestak

141. The defendants contend that Bestak anticipates claims 19 and 20 of 177 and claims 2 and 3 of 722. Conversant's position is summarised in a Note on Claim Construction and Novelty served during the trial. It is common ground that no separate issues arise relating to claims 2 and 3 of 722, so the case can be dealt with by focussing on 177. One also has to bear in mind that claims 19 and 20 of 177 are dependent on claim 18, just as claims 2 and 3 of 722 are dependent on claim 1.

142. The features Conversant contends are not disclosed in Bestak are features 18(b) and 18(e) of claim 18 and all of claims 19 and 20. It is not quite right to turn that around and say that therefore Conversant accepts Bestak discloses features 18(a), 18(c) and 18(d) because some of those features contain language (such as "fixed allocation") which refers back to disputed feature 18(b). However it is helpful to understand what it is undisputed that Bestak does disclose. I believe the following is common ground but in any event I find that Bestak discloses a mobile station (feature 18(a)) which is configured to receive a first data packet on the shared data channel using the transmission parameters of first control information, the first data packet being in what the defendants contend but Conversant denies is a fixed allocation (feature 18(c)).

143. Furthermore, the mobile station is also configured so that for at least one subsequent reception on the shared data channel in what the defendants contend but Conversant denies is a fixed allocation, it can receive control information at the mobile station on the shared control channel, the control information comprising one or more different transmission parameter values, only if one or more transmission parameter values for said at least one subsequent reception differ from one or more corresponding values used for receiving the first data packet. That is feature 18(d). Notably, subject to the definition of fixed allocation, Conversant accepts that Bestak does disclose a mobile station configured to do this. That is because the claim relates to reception of control information rather than to transmission.

144. There are two disputes about feature 18(b). The first concerns fixed allocation, and that has a number of dimensions, and the second is whether Bestak receives both fixed and normal allocation data packets at the same time.

145. Bestak's periodic allocation scheme clearly involves a fixed allocation of timing resources, and it is a positive act of allocation of those resources to a logical channel. Conversant contends that based on its case on the true construction of fixed allocation as requiring the not sending of control information, no fixed allocation properly so called is disclosed in Bestak because there is no disclosure there of the idea of not sending control information. Since I have rejected that construction, this point does not help the patentee.

146. The next question is about transmission parameters. Although Bestak positively fixes timing, there is no disclosure of any allocation of transport parameters. The transport parameters will be the same from packet to successive packet in Bestak (that is why the reuse idea works) but there is no sense in which the parameters have been allocated to a given logical channel. The reason why not is because Bestak does not disclose the idea of not sending control information. At the risk of anthropomorphising, the transmitter cannot sensibly "know" that it can not send a

control message for a subsequent packet unless it has an awareness of an association between the transport parameters for the previous packet and the parameters for the subsequent packet for the same logical channel to which the fixed allocation applies. This is perhaps a point about claim construction rather than novelty, but it arises here. It explains the sense in which there needs to be some positive allocation of resources (parameters and optionally timing) in the Conversant patent.

147. However this does not necessarily mean claim 18 – in respect of feature 18(b) – is novel. That is because that claim is concerned with a mobile configured in certain ways. This is where the second point made by the defendants in response to this fall back construction by Conversant comes home to roost. In summary, what claim 18 requires, particularly focussing on 18(b), is that the mobile is configured to receive control information associated with fixed allocation data packets. A mobile configured in accordance with Bestak will be able to do this. The reason is that the positive allocation of transport parameters, itself, makes no difference to what the mobile receives and no difference to what the mobile has to do in order to receive control or data packets. Therefore these fixed allocation issues do not show that claim 18 is novel over Bestak.

148. The second dispute relating to feature 18(b) is whether Bestak discloses sending both fixed and normal allocation data packets at the same time. The defendants contend that it does, Conversant that it does not. The issue is about the simulations in Bestak which undoubtedly involve two kinds of service – background and streaming; in other words two logical channels, one with normal packets and one with a fixed allocation of time. The argument also involves a point that because each mobile in the simulations was modelled as only getting a single stream, inevitably no mobile received both kinds of streams at the same time. The argument also involves the reference to co-existence in the passage in Bestak at p90 section 5.3.2.

149. The skilled reader reading Bestak would understand that it is contemplating both modes as coexisting in the sense that they include different services being sent to the same mobile at the same time. That is the natural reading of the reference to co-existence, particularly when considered in the context of the document as a whole. Prof O'Farrell's view was that that is how the skilled reader would understand what Bestak teaches. Mr Wiffen's view was to the contrary, and was based to a large degree on the simulations. I do not accept that the simulations take things far enough to contradict the clear teaching of the document. The simulations only modelled one stream per mobile for the sake of simplicity. Therefore, I find, Bestak discloses sending both fixed and normal allocation data packets at the same time to the same mobile.

150. Thus feature 18(b) does not give claim 18 novelty over Bestak.

151. Turning to feature 18(e), the question is whether Bestak discloses a mobile configured to receive from the RAN an indication to store control information to use it for a subsequent data packet. The arguments are really about construction. In terms of disclosure: Bestak teaches the idea of the mobile storing control information (including transmission parameters) related to one packet and then reusing it for a subsequent data packet in the periodic allocation. The periodic allocation itself would be established by higher layer RRC signalling. The defendants' case put to Mr Wiffen was that once a mobile had received the signal on the RRC to establish the

periodic allocation, it would be able to determine that it should store transmission parameters for packets received in the allocated T-slots. He agreed. I accept that evidence.

152. Conversant submitted that to be a relevant indication, the mobile had to be configured so as to be able to understand it. I agree.

153. Conversant argued that the indication in feature 18(e) had to be something tangible and was not satisfied by a scheme in which the mobile would store control information simply because it was in a mode in which that was done. I accept that and reject the defendants' submission to the contrary. The reader would think the indication was something specific. Thus the fact the mobile in Bestak knows to store control information just by virtue of being in the periodic allocation is not enough. Putting it another way the mere timing of a control message is not an indication.

154. Conversant also submitted that to satisfy the claim, the indication had to be in a per packet basis. I agree. It comes from the language of feature 18(e) which refers to parameters received for a subsequent data packet. It is another reason why the fact that the mobile may store just because it knows it is in the periodic allocation does not satisfy the claim.

155. Related to this is Conversant's submission that the indication must be concerned with whether to store control information in the fixed allocation. I do not accept that. As the defendants point out, Mr Wiffen explained that the indication to store described in the patent (para [0046]) disclosed a means of differentiating between fixed and normal allocation packets (Wiffen I paragraph 378 and 379). There is nothing in the claim language which rules that out.

156. The debate then comes to the one bit flag described in Bestak at p90 and quoted above. The defendants put questions to Mr Wiffen about what the mobile would do if it received control information including the one bit flag. The one bit flag is described expressly as an indication that there will be no data packet in the subsequent T slot. The point put to Mr Wiffen was that the reader would understand that in a case in which the one bit flag was used, the result would be that it was set to a state (say set to 1) in which the subsequent packet in the T slot was not for the UE and therefore logically, was set to another state (say set to 0) if the subsequent packet in the T slot was for the UE. Mr Wiffen agreed that the mobile would store the control information when the flag was set to indicate the packet was for the UE (0) and would not store the control information when the flag was set to indicate the packet was not for the UE (1). I accept that evidence. It is a tangible indication and it is on a per packet basis. Those requirements of feature 18(e) are satisfied. I have not accepted the other limitations in feature 18(e) which Conversant sought to read in to avoid Bestak.

157. Accordingly claim 18 is not novel over Bestak.

158. In terms of claim 19, the only issue is feature 19(d). It requires the mobile to be configured so that it will actually store the control information in response to the relevant indication. This is taught by Bestak for the reasons examined above.

159. I turn to claim 20. The claim distinguishes between first transmissions and retransmissions, in other words the initial transmissions of data and second transmissions resending data in a HARQ process following a problem. The claim refers to the idea of storing control information for packets which are first transmissions and not doing so for retransmissions.

160. The defendants contended that this claim does not require the mobile to be configured in any additional way given that claim 18 already requires the mobile to be configured to receive indications to store transmission parameters. The defendants also argued that there is nothing in the claim which requires the mobile to interpret the indication as having particular reasons attached to it nor any disclosure in the patent how to do that. Finally there is nothing in the claim which requires the mobile to respond to the indication in a particular way.

161. Conversant did not agree. It argued that the claim does impose requirements on the configuration of the mobile, that the claim language required that certain consequences followed in certain circumstances and that therefore the mobile has to be configured to interpret the indication as having those consequences in those circumstances. What the claim is concerned with is storing for a first transmission and not storing for a retransmission.

162. Claim 20 is oddly worded. The wording is strangest when read in isolation but the claim is a dependent claim and when it is put together with its predecessors the reader would understand it. The claim is not meaningless and does impose a requirement relating to the mobile's configuration which is on top of claim 18 (and 19). To be within claim 20 the mobile has to be configured to act on the indication in the right way in the right circumstances. In other words Conversant is right that the mobile must be able to interpret the indication. It should store for a first transmission but not store for a retransmission.

163. Thus claim 20 is novel over Bestak.

164. Claim 35 is novel over Bestak but only as a result of feature 35(f) (higher layer signalling of HARQ process ID). Feature 35(e), defining a periodicity using higher layer signalling, is disclosed in Bestak.

165. Therefore claims 20 and 35 are novel over Bestak but claims 18 and 19 are not. The corresponding conclusions applied to the 722 patent are that claims 1 and 2 are anticipated but claims 3, 13 and 14 are novel.

Obviousness over Bestak

166. The ***Pozzoli*** approach to considering obviousness is to identify the inventive concept, identify the person skilled in the art and the common general knowledge, identify the differences between the claim and the cited item of prior art, and then ask whether the claimed invention is obvious to the person skilled in the art.

167. Although out of order, I start with making the point that the skilled person and the common general knowledge have been addressed above.

168. The complexity of the claims means that this is one of those cases in which there is some value in identifying an inventive concept which does not simply arise from the claim language. I have already defined the core feature of the invention above. It must be part of the inventive concept too. Expressed in the context of HSDPA, the inventive concept is the idea of not sending an HS-SCCH control message with every data packet sent on the HS-DSCH. The idea is generalised out in the claims so that it is not limited to the downlink nor limited to UMTS, but nevertheless this is a convenient way of summarising the core idea.

169. Now of course the mobile station claims of 177 and 722 which are in issue do not expressly include the core feature of the invention. Moreover the features which make them novel are features relating to retransmissions and HARQ processes. Therefore one might think the inventive concept ought to include some reference to that. I decline to do that not because those features are irrelevant but because they in fact arise as further aspects of the same inventive concept I have already defined.

170. In terms of identifying differences, as I have already said, what makes the relevant claims novel are features relating to retransmissions and HARQ processes. However the whole obviousness case is focussed on the obviousness of not sending control information and then the consequences that would follow. The defendants' case was that the retransmission/HARQ features of the relevant claims were obvious to the skilled team following up that central idea. There is no case, and no evidence, that they would be obvious otherwise. There is nothing, for example, to suggest that a skilled team would do anything relating to retransmissions or HARQ if they did not take the step of not sending control information. Accordingly, unusual though it is, there is no need to think further at this stage about the differences between the claims and Bestak.

171. All that is necessary to note at this stage is that the defendants' obviousness case is founded on the premise that to be within the claims, starting from HSDPA, the system would be modified to not send an HS-SCCH control message with every relevant data packet sent on the HS-DSCH.

Submissions of January 2020

172. After the draft judgment was sent to the parties, the defendants filed written submissions in line with ***Regeneron v Kymab*** [2018] EWCA Civ 671 at paragraph 175, submitting that paragraphs 170 and 171 above were wrong and in fact the defendants did maintain a distinct obviousness case over Bestak regardless of whether the skilled team took the step of not sending control information. In the end three notes were filed, the defendants' first note of 2nd January 2020, Conversant's note of 3rd January and the defendants' reply note of 4th January.

173. Conversant submitted that paragraphs 170 and 171 were in substance accurate given the way the defendants' case was put. I will not decide this case that way. In fact there was an explicit indication that this alternative case was maintained by the closing, it was footnote 14 to paragraph 254 of the defendants' written closing submissions, which I missed. It remains the case that almost the whole of the defendant's obviousness case is as described at the start of paragraph 170, but I recognise that the defendants did advance a different case. The remainder of the judgment is unchanged and I will deal with the alternative case at the end.

Obviousness over Bestak (resumed)

174. Part of the defendants' case was that the prior art was to be read by a skilled team already considering the VOIP overhead problem. Given the findings on common general knowledge, that would be the wrong approach. Nevertheless putting VOIP on wireless networks such as UMTS was a matter of considerable interest to the skilled team at the time, and it is not hindsight to postulate a team reading Bestak in that context.

175. In my judgment, when the members of the skilled team interested in implementing VOIP on UMTS read Bestak, with interest, neither the RAN architect member of the skilled team, nor the engineers focussed on layer 1 or layer 2 or the interface between them, or any other members of the skilled team, would think of a VOIP overhead problem. There are a number of reasons why not. VOIP is not mentioned at all either by name or by implication. What I mean by saying it is not mentioned by implication is that the text does not refer to the idea of doing a voice call by any method other than circuit switching. Nevertheless the skilled team reading Bestak has VOIP in mind and would, I find, regard it as similar to audio streaming. They would also (see below) be interested in the periodic allocation. However none of this would cause the team, without hindsight, to think of the VOIP overhead problem. Bestak does not refer to an overhead problem at all.

176. The skilled team would regard Bestak's periodic allocation idea as worth considering. Although disclosed expressly in the context of streaming, if it matters I would hold the team would think it was potentially applicable to VOIP too. There was a point about VAD and the conversational nature of a voice call, as opposed to streaming, but the skilled team is familiar with that. This distinction does not make a material difference to the issues.

177. There had been a previous proposal to do VOIP on UMTS called IMS but it had not succeeded. I cannot help but think that any skilled team thinking of VOIP in UMTS would have had this well in mind, and would have known more about it than the evidence allows for in this case. However on the evidence as it is this point goes nowhere.

178. The defendants' case, supported by Prof O'Farrell, is that the skilled team would understand that the reuse of control information in Bestak when channel conditions were steady would lead the skilled team to understand that control information was redundant. Mr Wiffen accepted that the skilled person would understand that control information was redundant when transmission parameters did not change. The distinction between channel conditions and transmission parameters is that transmission parameters are capable of changing even if channel conditions stay the same (because users could join or leave a cell).

179. Then it is said by the defendants that since it is redundant, it would be obvious to omit it. This was put to Mr Wiffen in two steps. First it was put, and he agreed, that it would be apparent to the skilled person that a previously correctly received control message could be used to decode the data, even when the control information that accompanies it has not been received, and he agreed.

180. Then it was put that a previously correctly received control message could be used to decode the data, even if the control information that accompanies that had not been sent, and he agreed with that too.

181. However there is a danger of hindsight creeping in here. If an overhead problem of some kind had been common general knowledge then I can see that it might not involve so much hindsight for a team to start thinking about not sending control messages and the possible implications. However there is not a word in Bestak about not sending control messages. The document is and is only concerned with not successfully decoding a control message which had been sent.

182. Prof O'Farrell's evidence was that given what he regarded as the general principle of using the least amount of control information to transmit the greatest amount of data, it would have been obvious to configure the network to transmit control information only when conditions change and new transmission parameters are needed, so as to reduce control signalling overhead.

183. The defendants put to Mr Wiffen that the skilled person had two options – to send the redundant information (which may increase robustness to some degree) or not send the redundant information, which will lead to a saving in network resources (providing there was no impact elsewhere) – and that which the skilled person chooses to do will depend on their priorities and the circumstances (an assessment that would be 'bread and butter' to the RAN architect). In the cross-examination although Mr Wiffen accepted that not sending the control information was an option for the skilled person, he maintained it was not an obvious one.

184. One of Mr Wiffen's reasons involved the detailed and unconvincing argument that an alternative of reducing power in some circumstances might make the option of not sending control information less obvious.

185. However of more significance are two simpler points. The first is that in Bestak the control information is sent as normal and, as I have already noted above, there is no hint in the document at all of the idea of not sending control information. The benefits of the periodic allocation described in Bestak can be obtained without taking the step of not sending control information. The second is that to the skilled team, the HS-SCCH control messages are what gives HSDPA its flexibility. That was common general knowledge.

186. Prof O'Farrell's view was based on the idea that the skilled team already had an overhead problem in mind like the VOIP overhead problem, but I have found they did not. His view was also based on the higher level idea that the team was always seeking to reduce control overhead, but I have not accepted the position is that simple either. Looking at the issue at this higher level, the skilled team knew that the control information had a utility in general terms in facilitating flexibility.

187. The foregoing are the reasons why, in the absence of an overhead problem being part of the common general knowledge, the idea that the skilled team reading Bestak would think of not sending a control message is tainted with hindsight. It was not obvious. Without it the rest of the defendants' case on lack of inventive step falls away.

188. The obviousness case involved a large number of further points. I mention the more significant ones now. Conversant argued that while the skilled team would be prepared to adopt the fixed time idea of Bestak, it would not be obvious to adopt the re-use idea. I do not agree, for the reasons explained below.

189. One of Conversant's arguments was that if the UE had failed to decode the HS-SCCH message, it was unlikely to be able to decode the associated data anyway. That is because the HS-SCCH message is coded in such a way that it is more robust to errors cause by poor channel conditions than the data packet and so if things are so bad that the former does not get through, the latter has even less chance. So the skilled person would think the re-use idea was not worth adopting. I reject this. It is a good example of a hindsight argument deployed to support non-obviousness. I am not satisfied the skilled person would think like this at all. It would never occur to them as a reason for not taking the idea forward.

190. The other was a point about HARQ processes. This became very convoluted and unconvincing. In my judgment if a skilled team did decide to take the Bestak ideas forward and decide to not send control messages in certain circumstances, they would know that they needed to take care with HARQ processes and retransmissions, because signals concerning HARQ processes are part of the control information. If they got that far then in my judgment they would be able to make a working system without any further inventive step(s). Four obvious expedients would be: to send retransmissions in slots different from the dedicated T slots used in the fixed allocation, to use an indication to store control information which meant that the information should be stored for first transmissions but not retransmissions, to use higher layer (RRC) signalling to send HARQ process IDs for the fixed allocation, and for the mobile only to store control parameters for future use for the HARQ process IDs sent by the higher layer signalling. Accordingly claims 20 and 35 of 177 and claims 3, 13 and 14 of 722 would have been obvious if I had accepted the defendants' main case.

191. Another point made by Conversant was that the reluctance of the skilled team to change a telecoms standard would play a part in this analysis. Questions were put to Prof O'Farrell about this. I was not convinced there was anything in this point. If the skilled team thought a problem they had could be solved in a manner which departed from the standard, that would not deter them. A difficulty having an expedient adopted into a future standard might be a commercial barrier but it does not change the technical issues which may or may not render something obvious.

192. I was not convinced that the fact that the reuse of control information involved storage (of previously used control information) created any technical difficulty for the skilled team or would put them off. Nor is there anything in the point that to implement this part of Bestak the mobile has to be told about the parameters of the periodic allocation somehow. The skilled team would have no difficulty with that as a concept, probably by using higher layer signalling.

193. Finally, there was a point on the 1 bit flag to tell the UE that there will not be data in one of the reserved T slots. The arguments about this were overdone. With a will to find fault, it can be seen that this proposal is not fully thought through but it is light years away from something which would put the skilled team off taking up the periodic allocation proposal in general.

Added matter / lack of support

194. The defendants contended that various aspects of the claims amounted to added matter or a lack of support. As it happens all the objections relate to features sought to be added by amendment. Nevertheless it is worth being clear that added matter relates to information disclosed by the granted patent (or as a result of a post grant amendment) which was not disclosed in the patent application as filed. However a claim which is wider in scope but does not disclose any new information does not add matter and is not invalid on that ground. Lack of support is a different idea. A claim can lack support if it is wider in scope than something fairly based on the disclosure in the application as filed even if the extra width is only covered by the claim and not disclosed by it. But lack of support is not a ground of invalidity available post-grant to a granted claim, whereas it is a valid objection to a post-grant amendment. So to be allowable, a post grant claim amendment must not cause the amended claim to lack support or add matter, while in relation to a granted claim, the only validity objection is added matter. Lack of support may lead to a loss of priority but that is another matter.

195. The claims or claim features the defendants attack under this general heading are:

i) Feature 18(e)

ii) Claim 20

iii) Feature 35(f)

iv) Claim 14 of 722

196. I start with feature 18(e). This is the indication to store feature. Although it is set out elsewhere in this judgment it is helpful to set it out here:

> 18(e) receive an indication from the radio access network whether the transmission parameter values of the control information received for said at least one subsequent reception should be stored by the mobile station

197. The main basis for this feature are passages at p17 (published page numbers) of the application as filed (WO2006/114689) under the heading New Data Indicator. This corresponds to paragraphs [0045] and [0046] of the 177 patent. The passage as a whole is:

> "New data indicator (NDI)
>
> The NDI is the only parameter whose value changes between new transmissions even if the transport format, etc., remain the same. Thus it cannot be part of the fixed allocation. As described above, this may not be a problem if HS-SCCH is always sent for retransmission and for a new transmission after retransmission (or in other words, HS-SCCH transmission is avoided only when the previous new transmission was ACKed immediately (no retransmissions)).

> Another possibility could be to replace NDI and RV with retransmission sequence number (RSN) in the similar way as on E-DPCCH in HSUPA. Then RSN=O tells the first transmission and thus UE always knows whether the HS-SCCH parameter values should be stored (1st transmission) or not (retransmission).
>
> Another possibility is to indicate to the UE that the HS-SCCH parameters should be stored. This could be done with a 1 bit flag added on HS-SCCH (or HSDSCH). This flag would be set to one when the HS-SCCH parameters are such that they could be used for the next transmission (provided that the RLC PDU size etc. remain constant)."
>
> [*The first paragraph on p17 has been divided into two parts for clarity. The first two paragraphs above correspond to [0045] in 177 and the last paragraph is [0046]. The English is not perfect but the sense is clear enough*]

198. Both the second and third paragraphs above amount to an express disclosure of the idea of using an indication to store however that is not the end of the matter. The defendants' case was that if feature 18(e) was construed in certain of the ways contended for by Conversant then it involved added matter or lacked support. I will consider only the points on construction which I have accepted. They were that the indication has to be something specific and tangible, and that the indication has to be on a per packet basis. Neither of these ideas amounts to new information as compared to what is disclosed in the application nor does feature 18(e) strip the concepts disclosed here of the context in which they are disclosed in a manner which would not be clearly and unambiguously apparent to the skilled reader. In my judgment there is no added matter nor any lack of support.

199. Turning to claim 20, it is concerned with storing for first transmissions and not storing for retransmissions. This is exactly the idea which is disclosed at the end of the middle paragraph of the quoted passage above (p17 ln 9-13). It is true that the claim is wider in scope because it is not limited to replacing the NDI with a retransmission sequence number but I am not convinced any intermediate generalisation or lack of support exists. The reader would see the idea in the application and not think that it was a critical part of the idea that it had to be employed only as part of a retransmission sequence number (RSN) approach. I reject the added matter and lack of support arguments.

200. Feature 35(f) is about receiving a HARQ process ID used for the fixed allocation at the higher RRC layer. The defendants submitted that because the meaning of the claim can only emerge from the proposed amendment there must be added matter. That is wrong. Once the claim is construed, it may or may not add matter (or lack support).

201. The first argument is that while the claim is not limited to the situation in which only one HARQ process ID used for the fixed allocation is signalled by RRC, this means it lacks support because, as Mr Wiffen accepted, the disclosure is limited to the use of a single HARQ process notwithstanding the fact that the skilled person would want to

be able to use more HARQ processes for other services. I do not accept this. It is true that Mr Wiffen accepted what was put to him but it does not follow that the claim lacks support. Even though only one HARQ process is discussed in the disclosure, the reader would not think that was an essential feature of what was being disclosed. It plainly is not. The reader would expect to use multiple HARQ processes in practice and a claim which covers multiple HARQ processes is not an unfair generalisation from the disclosure. So there is no lack of support. Nor is there any added matter. While it covers more than one HARQ process, it does not disclose it.

202. The idea of signalling a HARQ process ID using higher layers is disclosed at the end of the passage at p11 ln 9-20 of the application (paragraph [0034] of the 177 patent). There is a second argument from the defendants which has something to do with the defendants trying to take advantage of some convoluted and unconvincing evidence from Mr Wiffen, based on that passage in the disclosure, about what were called overwriting and overriding problems. However I do not accept that evidence and in the end I do not see there is any problem with this feature. The patent discloses the idea of signalling a HARQ process ID to be used for the fixed allocation using higher layers and that is what feature 35(f) is based on. I can see no intermediate generalisation, no added matter and no lack of support.

203. Finally, for claim 14 of 722, the conclusions I have reached above mean that claim 14 does not add matter or lack support either. It is not necessary to get involved in the argument about using a HARQ process ID as an indication to store (another of Mr Wiffen's ideas) to decide the issues for this claim.

Essentiality/Infringement

204. There is no dispute that if it was valid the 206 patent would be essential to the optional feature called HS-SCCH-less operation in the HSPA+ evolution of UMTS (release 7 onwards).

205. The issue is whether the 177 and 722 patents are essential to the semi persistent scheduling (SPS) aspect of LTE. Note that so far this judgment has focussed on UMTS (3G). LTE is the next generation - 4G.

206. The way SPS in LTE works is as follows. In LTE, all downlink data is carried on shared channels. LTE has a mode called dynamic scheduling (DS) mode. It is like HSDPA in UMTS in that resources are allocated to mobile devices on a data packet by data packet basis. Each data packet is transmitted to the mobile device on a shared data channel, with associated control information on an associated shared control channel. However LTE also has the Semi-Persistent Scheduling (SPS) mode. In SPS, a particular UE is given a connection that is fixed and periodic, but where certain parameters relating to the transmission can change. In the SPS mode, control information on the shared control channel can be omitted. When the control information is omitted, data is decoded using stored control information.

207. The channel structure in respect of the shared control and data channels is similar to that of HSDPA. There is a Downlink Shared Channel (DL-SCH) which transmits downlink data. It is carried on a physical channel called the Physical Downlink Shared Channel (PDSCH). These are like the HS-DSCH and HS-PDSCH in HSDPA. Then in LTE there is an associated shared control channel called the Physical

Downlink Control Channel (PDCCH) which carries control information for the shared data channel. This is like the HS-SCCH in HSDPA.

208. The control information carried on PDCCH is called Downlink Control Information (DCI). It carries downlink scheduling assignments (and other signalling messages). Downlink scheduling assignments define, for the associated data, the radio resources (i.e. one or more allocated PDSCH resource blocks) and parameters for use in demodulating and decoding the allocated resource blocks.

209. When a mobile device connects to the network, it is assigned an identifier called a C-RNTI (Cell Radio Network Temporary Identifier). This is used as a UE-specific (and mode-specific) mask for control information and data. The mobile device monitors the control channel. It can identify DCI control information on this channel that is intended for it, since the DCI is scrambled with that device's C-RNTI. The mobile device then uses parameters provided in the DCI to locate and process the associated data (the PDSCH resource blocks).

210. Before SPS can be activated, it has to be configured. This is done by means of RRC signalling. The configuration information that is sent includes various parameters, including another Cell Radio Network Temporary Identifier (like the C-RNTI), which again is specific to the mobile device but also specific to SPS mode. This is the SPS C-RNTI. When masking of DCI control information is done with the SPS C-RNTI, the mobile knows that the DCI relates to its SPS mode.

211. Also signalled as part of the configuration information is a field with the catchy name "numberOfConfSPS-Processes" which indicates to the mobile device the number of HARQ processes to be used for its SPS mode. Conversant contends that this will also therefore indicate which HARQ processes are to be used for SPS mode but I will come back to that. The field can be set to a value of 1 to 8.

212. Finally, since if there is SPS data for the mobile device sent without control data it will come periodically, the configuration information includes an SPS periodicity parameter.

213. Once configured, SPS is not active until the mobile device receives an SPS activation message. A flow chart was provided by Mr Wiffen to show what happens after that. An SPS activation message is a special sort of DCI message that accompanies the first data block that is sent in SPS mode. The activation message is masked with the SPS C-RNTI, to show that it relates to SPS mode. It contains various parameters. The three which matter are as follows:

    i) the New Data Indicator (NDI), which is set to '0';

    ii) the HARQ process number parameter, which is set to '000' (assuming FDD mode);

    iii) An indication of the control parameters, which should be stored to be used to decode data sent without control parameters.

214. If the mobile finds a DCI masked with its SPS C-RNTI, it checks the NDI. An NDI of 1 (which in SPS means a retransmission of data following a NACK) is not

compatible with a valid activation message, so if that is what is received at this stage the mobile does not activate SPS but just returns to monitoring for a relevant DCI. If NDI is 0, the mobile device checks for the special format of the DCI that shows that there is an SPS activation message.

215. When it has verified that there is an SPS activation message, the mobile stores the parameters received in this DCI message. Then a periodic timing counter is initialised, according to an equation specified in the standard, which causes the mobile to expect SPS data in the TTIs with the periodicity signalled in the RRC configuration message. SPS operation has now been activated.

216. When SPS is active, both DS mode and SPS mode run in parallel on the same mobile device. It can therefore still receive DS packets. They can come both outside of the periodic slots allocated to SPS mode or within them. In either case the DS packets are known not to be SPS packets, since their accompanying control information is masked with the C-RNTI and not the SPS C-RNTI.

217. The mobile device monitors the PDCCH for a DCI that is masked with its C-RNTI or SPS C-RNTI. If it finds one masked with its C-RNTI, this shows the presence of a DS packet, so the mobile goes through the normal process of decoding the accompanying data using the control information in the DCI. Thus DS packets can take precedence over SPS packets, since a DS packet can occupy one of the periodic TTIs set up for SPS reception.

218. If the DCI control message was not masked with the C-RNTI, the mobile device checks for masking with its SPS C-RNTI. If no SPS C-RNTI is found, this may mean that there is data being sent for the mobile device but without control information. This may occur but it will only occur if the time slot is one of the periodic time slots that was configured, so this is checked. If this is not one of those time slots, the mobile device simply returns to monitoring the PDCCH for DCIs. If it is one of the periodic time slots, then the mobile tries to decode the data on the DL-SCH using the stored control parameters.

219. When a DCI control message masked with the mobile's SPS-C-RNTI is received, if the NDI is 1, this is a retransmission and not relevant to the analysis at this stage. If the NDI is 0, this means that DCI control information is being sent that is relevant to SPS mode. This is either:

    i) a special message that indicates that SPS mode is being deactivated;

    ii) or control information that contains updated SPS control parameters, to be stored for reuse. This is called SPS re-activation.

220. This SPS re-activation can occur in any TTI. As in the case of the initial SPS activation, SPS re-activation DCI is accompanied by data on the shared data channel, which is decoded with the newly updated SPS parameters.

221. The way the HARQ process works is as follows. Instead of identifying the HARQ process from the DCI message (as happens in DS mode), the appropriate HARQ process is established by deterministic cycling through HARQ process IDs based on knowledge of the number of HARQ processes used for SPS which was communicated

over RRC in the SPS configuration stage. The HARQ process that is used for a given periodic SPS reception cycles from 0 upwards, wrapping around back to zero once the number of configured HARQ processes is reached, using an equation specified in the standard.

222. For example imagine a case in which three HARQ processes are configured for SPS mode. In the first periodic slot used for SPS, the equation always gives the result 0, so HARQ process ID 0 is used. In the next slot, the equation gives the result 1, so HARQ process ID 1 is used. The next is 2, and then it goes back to 0. In this way, the number of configured HARQ processes determines which HARQ process is used for any given periodic TTI. The standard allows for the number of configured HARQ processes for SPS to be 1. In that case, the equation has the result that the HARQ process ID will 'cycle' from 0 to 0. In other words, if the RRC SPS configuration message says that only a single HARQ process is configured for SPS, this necessarily entails that the HARQ process ID that is used for SPS is always zero.

223. If it matters I find that the source of the HARQ process ID used for the first transport block in an SPS assignment (i.e. the one accompanying the SPS activation message) is the application of the equation.

224. Knowing all this, one can now determine essentiality.

225. It is common ground that claim 19 (dependent on 18) reads onto SPS save for a dispute about feature 18(e). Conversant contended that the DCI activation or reactivation messages satisfy this feature whereas the defendants do not agree. The issue is that in SPS there is no single flag or field which operates on its own as an indication to store and an indication not to store. For the mobile to store the parameters requires both that the NDI field is 0 and that the other fields in the DCI are for SPS activation, whereas the indication not to store is that the NDI is 1, irrespective of the other fields. The defendants contended that Conversant's case was that the claims required a single indication to store or not to store and that does not exist in SPS. Whether it is Conversant's case or not, I have not accepted that way of reading the claims above, nor do I accept it now. The skilled reader would not interpret the grammar of the claims (such as the singular in claim 18 and the definite articles in claim 20) in that way. The terms are entirely apt to cover the way SPS works.

226. Turning to claim 20, the defendants repeat the single flag/field point I have rejected already and also contend that there is no interpretation of the indication by the phone. I have accepted Conversant's case that claim 20 requires the phone to interpret the information so as to act in the right way in the right circumstances. In my judgment the phone in SPS does exactly that.

227. Two issues arise on Claim 35, both concerning feature 35(f). The first is a point on construction. It is common ground that the claim is not limited to a situation in which only one HARQ process ID is used for the fixed allocation but the defendants say that this claim requires that the HARQ process ID(s) to be used for the fixed allocation must be reserved for use by the fixed allocation and therefore not available for the normal allocation. They argue that the only relevant paragraph in the specification is paragraph [0034], as follows:

> "[0034] In practice, this means that the same HARQ process should always be used for VoIP if this fixed allocation scheme is to be used. In order to save in UE memory and operations, this HARQ process ID used for fixed allocation could also be signalled by higher layers (RRC). Thus the UE would only store the HS-SCCH parameter values sent for this particular HARQ process."

228. This is about avoiding a "HARQ clash" in which, if one does not take care, two distinct processes try to use the same HARQ process ID. The defendants submit that the phrase "used for [*the*] fixed allocation" in this passage, which is the same words as in feature 35(f), would be understood to mean that the HARQ processes signalled by RRC were reserved exclusively for the fixed allocation. Conversant does not agree, contending that that is not how both experts understood paragraph [0034]. Conversant pointed out that Prof O'Farrell accepted in cross-examination that the paragraph says nothing about what should or should not be used for the normal allocation. I agree. The passage is about what to do about a HARQ clash, but the reader would not understand the words as mandating that a HARQ process ID used for the fixed allocation had to be for the fixed allocation's exclusive use and would not be available to the normal allocation.

229. On that construction, the claim covers SPS because the HARQ IDs are not dedicated to SPS.

230. The second issue is about what exactly is signalled to the mobile in SPS. As explained above the RRC signalling message includes a HARQ process number parameter which is the value for the number of HARQ processes to be used in SPS and then an equation is applied which cycles through the HARQ process IDs starting at 0. The defendants' point is that this is not a HARQ process ID at all, it is just a value used by an equation which will produce appropriate HARQ process IDs. As the defendants' observe, no argument based on equivalents is advanced, the issue is about infringement on normal construction.

231. Conversant contends that on a normal purposive construction of the claim, there is infringement. It argues that the experts agreed it was common general knowledge to send information in a bit efficient manner and that is all that is going on. The fact that the patent specification does not describe doing it this way is not relevant. Conversant also argues that the fact, as was common ground by the end of the case, that the claim covers reception of more than one HARQ process ID is relevant. There is no warrant to restrict the way in which those IDs (plural) are sent.

232. I am sure the skilled reader would understand the claim language to cover a case in which the signal included a value or values which were not themselves actual process IDs but were keys to use in a look up table of HARQ process IDs – if such a thing was necessary. Given that, in my judgment Conversant is right. Read purposively the claim covers this case. What the phone receives in SPS is a value which allows it to know what HARQ process ID to use for the fixed allocation in what circumstances. Therefore the claim covers SPS.

233. Finally I turn to Claim 14 of 722. It is dependent on claim 13, which for this purpose is the same as claim 35. If claim 35 had not covered SPS, neither would claim 13 or

14. The extra feature is 14(b). The HARQ process ID referred to in that feature is the one referred to in claim 13(i), in other words the one(s) signalled for use with the fixed allocation. Conversant contend claim 14 covers SPS because stored control parameters in SPS are applied only to data packets received in respect of HARQ processes that have been allocated for use in SPS via the RRC signalling already discussed. The defendants contended that the claim does not cover SPS because the storage of control parameters happens before the equation is used to determine the ID of the applicable HARQ process, therefore the control information is not stored in respect of a particular HARQ process ID determined by the equation.

234. In other words there is a measure of common ground about what is going on and a disagreement about whether the claim covers it. In my judgment the defendants are right. Since the storage of control parameters happens before the determination of the ID of the HARQ process, the fact that, as Conversant contend, those stored control parameters are only applied to packets received for relevant HARQ processes allocated to SPS does not bring the method within claim 14. It is the opposite. In SPS received control parameters are *stored for future use* (my emphasis) irrespective of the HARQ ID. The fact they may only be used later depending on the HARQ ID does not satisfy the claim. To satisfy the claim the storage for future use ought to have applied only to those parameters associated with the right HARQ process but it does not.

Obviousness over Bestak without omitting control information

235. In order to grapple with this I will start with two preliminary points. First, for the sake of brevity, in this section I refer to the idea of omitting control information as "OCI". Second, this aspect of the case is all about HARQ processes. In paragraphs 190 and 202 above I referred to some evidence about HARQ processes as convoluted and inconvincing. The observations were primarily directed to Mr Wiffen's evidence and Conversant's case but they also applied to aspects of the defendants' case seeking to take advantage of some of that evidence. This aspect of the matter involves dealing with some of that.

236. The claims in issue here are claims 20 and 35 of 177 (and correspondingly claims 3 and 13 of 722). There is also a point on claim 14.

237. Paragraph 190 above identified various obvious steps arising if, contrary to my finding, the skilled team did take Bestak forward including OCI. Four obvious expedients were identified:

i) to send retransmissions in slots different from the dedicated T slots used in the fixed allocation,

ii) to use an indication to store control information which meant that the information should be stored for first transmissions but not retransmissions,

iii) to use higher layer (RRC) signalling to send HARQ process IDs for the fixed allocation, and

iv) for the mobile only to store control parameters for future use for the HARQ process IDs sent by the higher layer signalling.

238. Expedient (i) and (ii) relate to claim 20, (iii) relates to claim 35 and (iv) relates to claim 14 of 722. These expedients were obvious because the control information the skilled team has decided to omit includes signals concerning HARQ processes and so it would be obvious to the skilled team they will need to take steps arising from that, such as using higher layer signals to send HARQ IDs. Just because they were obvious in that case does not mean they would be obvious without OCI.

Claim 20 of 177

239. I begin by identifying the differences between claim 20 and Bestak. To be within claim 20 the skilled team has to take three steps over Bestak, all without OCI. First, while they would, as I have already held, be interested in the periodic allocation proposal, nevertheless they have to be sufficiently interested to take it forward without having thought of OCI. This is a prerequisite for the following steps. The second step is that they must decide to implement retransmissions in some way. Third they must decide to implement a tangible indication to store for first transmissions and not to store for retransmissions such that the mobile station is within claim 20.

Paragraphs 198 and 202-204 of Prof O'Farrell's first report

240. In the defendants notes of 2nd and 4th January 2020, they relied on paragraphs 198 and 202-204 of Prof O'Farrell's first report as part of their case that claim 20 would be obvious over Bestak without OCI. In these passages Prof O'Farrell expressed the view that it would be obvious to implement retransmissions in the periodic allocation scheme of Bestak, that it would be obvious to do this by sending them outside the time slots of the periodic transmissions, and that it would also be obvious to not reuse transmission parameters used to encode those retransmissions and therefore obvious not to store them.

241. It would not require an inventive step for the skilled team to take what I have called the first step, and at least think through implementing the periodic allocation scheme of Bestak without OCI. In that case the second step is also obvious, in other words they would wish to implement retransmissions. They would do it by sending retransmissions in slots different from the dedicated T slots. To a skilled team who got that far, it would be obvious not to reuse the retransmission parameters and therefore obvious not to store them. However that does not fall within claim 20 because it does not involve a tangible indication to store or not to store in this context. As Conversant points out in its note of 3rd January 2020, Prof O'Farrell agreed in cross-examination that an explicit indication whether or not to store for retransmissions in those circumstances would be unnecessary. In my judgment claim 20 would not be obvious in that case. There is no reason for the skilled team to introduce the tangible indication required by the claim.

242. While Prof O'Farrell's view was that it would be obvious to use slots outside the periodic time slots, Mr Wiffen's view was different. Mr Wiffen contended that one obvious way forward was that the periodic allocation time slots could be used. The defendants relied on this because Mr Wiffen accepted that in such a case, when the retransmissions could be sent in the periodic time slots, it would be obvious to use a tangible indication within claim 20. However I was not at all convinced by Mr Wiffen's idea of sending retransmissions within the periodic time slots. Mr Wiffen's

view about implementing retransmissions in the same time slot as the periodic allocation was an aspect of wider parts of his evidence which I have not accepted. This was part of the reason why the finding in paragraph 190 about implement retransmissions was explicit in referring to tending them in different T slots from the periodic allocation. I recognise that in principle there can be two obvious ways forward, but that is not this case. The only obvious approach, with or without OCI, would be to implement retransmissions in T slots which were not part of the periodic allocation.

243. The one bit flag described in Bestak is the tangible indication to store which means that Bestak deprives claims 18 and 19 of novelty however it is not related to the retransmission issue. I do not accept it would have been obvious to turn the one bit flag idea in Bestak into an indication within claim 20.

Paragraph 395(h), 400 and 401 of Prof O'Farrell's first report

244. In the notes of 2nd and 4th January 2020, the defendants also relied on paragraph 395(h) of Prof O'Farrell's first report as part of their case that claim 20 would be obvious over Bestak without OCI. In the relevant passage Prof O'Farrell repeats his view that it would be obvious not to reuse parameters for retransmissions and then says:

> "An indication to store or not to store the control information depending on whether the transmission is a first transmission or a retransmission is an obvious way of achieving this. The exact manner in which the indication of whether or not to store is indicated to the UE would be a matter of simple design choice for the implementer."

245. I do not accept this makes claim 20 obvious either. As explained above, it does not follow from the fact that retransmission parameters sent outside the periodic allocation do not need to be stored for reuse that there is any need for a tangible indication within claim 20. I accept that if the team did decide to introduce a tangible indication then the exact manner of doing so would be a matter of design choice, but that does not help the defendants. Paragraph 395(h) does not contain a convincing reason why claim 20 would be obvious without OCI.

246. Paragraph 400 does not add anything. Paragraph 401 does make clear that Prof O'Farrell was maintaining his view as expressed in paragraph 395(h) for a case without OCI, (and so Conversant are wrong in their post-trial note to argue that paragraph 395 is purely concerned with a case with OCI), but paragraph 401 does not contain any further reason why claim 20 would be obvious beyond the ones covered so far.

247. Therefore I find claim 20 of 177 and claim 3 of 722 are not obvious over Bestak without OCI.

Claim 35

248. To be within claim 35 the skilled team has to take three steps over Bestak. First, they have to take it forward without OCI. Second they must decide to implement

retransmissions in some way. Third they must to use higher layer signalling to send a HARQ process ID. The first two steps are obvious for the reasons given already. The issue is the third step.

249. To recap, paragraph 190 found that if the skilled team did decide to take the periodic allocation idea forward with OCI they would need to take care with HARQ processes and retransmissions because the signals concerning HARQ processes are part of the control information they are omitting. However the case being considered is one in which control information is not being omitted. That control information includes HARQ process IDs. Thus the skilled team already has a working method for signalling that information. I am sceptical why it would be obvious to think of using a different one.

250. The defendants relied on paragraphs 404 to 407 of Prof O'Farrell's first report. It is fair to say that in some parts of these passages Prof O'Farrell appears to be expressing a view about what the claim covers rather than what would be obvious to do, and also expresses himself by reference the case when OCI is adopted (even when saying that is not what he is doing – such as the reference in para 407 to Annex 2 paragraphs 552 – 555). Nevertheless there is a point to address. It is the suggestion that since Bestak describes having a single "stop and wait process" for the periodic allocation, in such a case the same HARQ process ID would be used for the periodic allocation, and so that HARQ ID could be signalled by at higher layer such as RRC, particularly since the periodic allocation will be set up by RRC signalling anyway.

251. I see the point but I am not persuaded it establishes obviousness. Even if the skilled team decided to take forward the idea of using a single HARQ ID for the periodic allocation as a whole, or just use one HARQ ID at a time (as Conversant submitted), in either case I do not see why it would obvious to use RRC signalling for sending information which the scheme already sends to the UE via the HS-SCCH messages.

252. Furthermore Conversant argued that the skilled team would not want to use a single HARQ process in this way but would wish to use multiple HARQ processes. The defendants contended that the argument against claim 35 does not depend on only one HARQ process being used, and referred (in paragraph 258 of their closing, via paragraph 7 of their Note of 4th January 2020) to Professor O'Farrell in cross-examination explaining that that if more than one HARQ process was needed for the periodic allocation, then that would be done, and one could reserve one or two HARQ IDs for the periodic allocation and signal those over RRC. I agree that a skilled team could signal more than one HARQ ID over the RRC, but I am not convinced this would be obvious in the relevant circumstances. A skilled team putting Bestak into practice without OCI, who wanted to use more than one HARQ process, would not think of signalling those IDs via higher layer RRC. On the contrary, the team would simply use the existing HS-SCCH signalling for the HARQ IDs.

253. I have the same difficulty with the defendant's reliance on Mr Wiffen's answer at T3/440 ln10-24 (paragraph 6 of the defendants' note of 4th January referring to paragraph 257(c) of the defendants' closing). As Mr Wiffen accepted, in general terms, signalling HARQ IDs by RRC or HS-SCCH is a matter of design choice. That is why the skilled team could do it. But in the specific circumstances under consideration there simply no sufficient reason to do so. It would not be obvious.

254. Therefore I find claim 35 of 177 and claim 13 of 722 are not obvious over Bestake without OCI.

Claim 14 of 722

255. If claim 35 of 177 and 13 of 722 were obvious on this ground, then the RRC would be used to signal HARQ process IDs. In that case the extra feature of claim 14 of 722 would be obvious too. However since I have found claims 35 and 13 are not obvious, neither is claim 14.

Conclusion

256. I find:

i) In relation to EP (UK) 1 878 177, of the relevant claims in the form of the unconditional amendments:

a) Claims 19 (and 18) are invalid in that they lack novelty over the Bestak prior art;

b) Claims 20 and 35 are novel and involve an inventive step;

c) The added matter and lack of support objections are all rejected;

d) Claims 20 and 35 are essential to SPS in LTE (and claim 19 would be if it was valid).

ii) In relation to EP (UK) 3 267 722, of the relevant claims in the form of the unconditional amendments:

a) Claims 2 (and 1) are invalid in that they lack novelty over the Bestak prior art;

b) Claims 3, 13 and 14 are novel and involve an inventive step;

c) The added matter and lack of support objections are all rejected;

d) Claims 3 and 13 are essential to SPS in LTE (and claim 2 would be if it was valid). Claim 14 is not essential.

iii) EP (UK) 3 197 206 is not entitled to priority and is invalid over the prior art published before the application was filed on 26th April 2006. It will be revoked.

257. Overall the successful party is Conversant.

Annex – claims

258. Claim 18 of 177 as proposed to be amended is in this form:

a) A mobile station (UE1, 10) configured to:

b) receive first control information on a shared control channel from a radio access network at the mobile station (UE1, 10) for use in processing data packets transmitted on an associated shared data channel carrying both fixed allocation data packets, for which a fixed allocation is configured, and normal data packets without fixed allocation, and wherein the first control information comprises transmission parameters, the transmission parameters comprising a modulation and coding scheme used on the shared data channel;

c) receive a first data packet on the shared data channel using the transmission parameters of the first control information, the first data packet being in a said fixed allocation;

d) for at least one subsequent reception on the shared data channel in the fixed allocation, receive control information at the mobile station (UE1, 10) on the shared control channel, the control information comprising one or more different transmission parameter values, only if one or more transmission parameter values for said at least one subsequent reception differ from one or more corresponding values used for receiving the first data packet; and

e) receive an indication from the radio access network whether the transmission parameter values of the control information received for said at least one subsequent reception should be stored by the mobile station.

259. Claim 19 of 177 as proposed to be amended is in this form:

a) The mobile station of claim 18, wherein the mobile station is further configured to:

b) determine, using a mask for the mobile station, that the control information received for said at least one subsequent reception matches the mobile station;

c) decode said at least one subsequent reception using the control information received for said at least one subsequent reception; and

d) in response to the indication, when the indication indicates to the mobile station that the transmission parameters of the control information received for said at least one subsequent reception should be stored, store the transmission parameter values of the control information received for said at least one subsequent reception.

260. Claim 20 of 177 as proposed to be amended is in this form:

a) The mobile station of claims 18 or 19, wherein:

b) the indication indicates to the mobile station that the transmission parameters of the control information received for said at least one subsequent reception should

be stored if said at least one subsequent reception is a first transmission of a data packet; and

c) the indication indicates to the mobile station that the transmission parameters of the control information received for said at least one subsequent reception should not be stored if said at least one subsequent reception is a retransmission of a data packet.

261. Claim 35 of 177 as proposed to be amended is set out below. Features (a) to (d) are identical to those in claim 18. Claim 35 is:

a) A mobile station (UE1, 10) configured to:

b) receive first control information on a shared control channel from a radio access network at the mobile station (UE1, 10) for use in processing data packets transmitted on an associated shared data channel carrying both fixed allocation data packets, for which a fixed allocation is configured, and normal data packets without fixed allocation, and wherein the first control information comprises transmission parameters, the transmission parameters comprising a modulation and coding scheme used on the shared data channel;

c) receive a first data packet on the shared data channel using the transmission parameters of the first control information, the first data packet being in a said fixed allocation;

d) for at least one subsequent reception on the shared data channel in the fixed allocation, receive control information at the mobile station (UE1, 10) on the shared control channel, the control information comprising one or more different transmission parameter values, only if one or more transmission parameter values for said at least one subsequent reception differ from one or more corresponding values used for receiving the first data packet; and

e) receive second control information, the second control information for defining a periodicity of transmissions of data packets in the fixed allocation, from the radio access network to the mobile station (UE1, 10) on the shared data channel, the second control information being signalled at a radio resource control layer; and

f) receive, at the radio resource control layer, a HARQ process ID used for the fixed allocation.

262. Claim 1 of 722 as proposed to be amended is in this form:

a) A mobile station (UE1, 10) for:

b) receiving control information signalled from a radio access network over a physical layer downlink shared control channel, the control information including parameters indicating a modulation and coding scheme used on a data channel corresponding to the control channel, the data channel carrying both fixed allocation data packets, for which a fixed allocation is configured, and normal data packets without fixed allocation; and

c) receiving data packets on the data channel using the control information, wherein the mobile station is configured to:

d) determine, using a mask for the mobile station, whether first received signalling of said control information is for the mobile station, and in the event that the first received signalling of said control information is for the mobile station, receiving a first of said data packets on the data channel using the first received signalling of said control information (50, 52, 54), the first of said data packets being in a said fixed allocation;

e) after receiving the first of said data packets, determine, using the mask for the mobile station, whether second received signalling of said control information is for the mobile station, and in the event that the second received signalling of said control information is not for the mobile station, receiving a second of said data packets on the data channel using the first received signalling of said control information (56), the second of said data packets being in the fixed allocation; and

f) after receiving the second of said data packets, determine, using the mask for the mobile station, whether third received signalling of said control information is for the mobile station, and in the event that the third received signalling of said control information is for the mobile station, receiving a third of said data packets on the data channel using the third received signalling of said control information (50, 52, 54), the third of said data packets being in the fixed allocation,

g) wherein the third received signalling of said control information used for receiving the third of said data packets is different from the first received signalling of said control information used for receiving the first and second of said data packets, and

h) wherein the mobile station is configured to receive an indication from the radio access network whether the parameters of the control information received for a said received data packet should be stored by the mobile station.

263. Claim 2 of 722 as proposed to be amended is in this form:

a) The mobile station of claim 1, wherein the mobile station is further configured to:

b) in response to the indication, when the indication indicates to the mobile station that the parameters of the control information received for the received data packet should be stored, store the parameters of the control information.

264. Claim 3 of 722 as proposed to be amended is in this form:

a) The mobile station of claims 1 or 2, wherein:

b) the indication indicates to the mobile station that the parameters of the control information received for the received data packet should be stored if the received data packet is a first transmission of a data packet; and

c) the indication indicates to the mobile station that the parameters of the control information received for the received data packet should not be stored if the received data packet is a retransmission of a data packet.

265. Claim 13 of 722 as proposed to be amended is in this form:

a) A mobile station (UE1, 10) for:

b) receiving control information signalled from a radio access network over a physical layer downlink shared control channel, the control information including parameters indicating a modulation and coding scheme used on a data channel corresponding to the control channel, the data channel carrying both fixed allocation data packets, for which a fixed allocation is configured, and normal data packets without fixed allocation; and

c) receiving data packets on the data channel using the control information, wherein the mobile station is configured to:

d) determine, using a mask for the mobile station, whether first received signalling of said control information is for the mobile station, and in the event that the first received signalling of said control information is for the mobile station, receiving a first of said data packets on the data channel using the first received signalling of said control information (50, 52, 54), the first of said data packets being in a said fixed allocation;

e) after receiving the first of said data packets, determine, using the mask for the mobile station, whether second received signalling of said control information is for the mobile station, and in the event that the second received signalling of said control information is not for the mobile station, receiving a second of said data packets on the data channel using the first received signalling of said control information (56), the second of said data packets being in the fixed allocation; and

f) after receiving the second of said data packets, determine, using the mask for the mobile station, whether third received signalling of said control information is for the mobile station, and in the event that the third received signalling of said control information is for the mobile station, receiving a third of said data packets on the data channel using the third received signalling of said control information (50, 52, 54), the third of said data packets being in the fixed allocation,

g) wherein the third received signalling of said control information used for receiving the third of said data packets is different from the first received signalling of said control information used for receiving the first and second of said data packets,

h) wherein the mobile station is configured to:

i) receive further control information, the further control information defining a periodicity of transmissions of data packets in the fixed allocation, from the radio access network to the mobile station on the data channel, and the further control information is received via Radio Resource Control signalling, and

j) receive, via Radio Resource Control signalling, a HARQ process ID used for the fixed allocation.

266. Claim 14 of 722 as proposed to be amended is in this form:

a) The mobile station of claim 13,

b) wherein the mobile station is further configured to:

c) for said received data packets, only store for future use parameters of control information received on the shared control channel for the HARQ process ID received via Radio Resource Control signaling.

267. Claim 1 of 206 is in this form:

a) Method for execution in a mobile station (UE1) that is receiving control information on a High-Speed Shared Control Channel, HS-SCCH, which is a signalling channel of a radio interface between the mobile station and a High-Speed Downlink Packet Access, HSDPA, radio access network in a wireless telecommunications system, wherein the HS-SCCH signalling channel is a shared physical layer channel used to transmit said control information, the method comprising:

b) storing default HS-SCCH parameters received via Radio Resource Control, RRC, signalling for use in decoding data packets received over a High-Speed Physical Downlink Shared Channel, HS-PDSCH, which is a shared data channel;

c) receiving said control information signaled on the HS-SCCH signalling channel;

d) determining, using a mask for the mobile station, whether the control information is for said mobile station;

e) responsive to determining that the control information is for said mobile station, decoding a said data packet on the shared data channel according to said control information;

f) responsive to determining that the control information is not for said mobile station, decoding the data packet on the shared data channel using said stored HS-SCCH parameters; and

g) delivering decoded data to higher layers.