

a first step of selecting an antenna whose tilt angle is to be reduced;
a second step of calculating a deterioration rate of the system resulting from changing the tilt angle at least once, when a tilt angle of the antenna selected in the first step has been reduced;
a third step of selecting an antenna whose tilt angle is to be increased;
a fourth step of calculating a deterioration rate of the system resulting from changing the tilt angle at least once, when a tilt angle of the antenna selected in the third step has been increased;
a fifth step of outputting an optimal tilt angle, for use in controlling the angle of the antennas, the optimal tilt angle corresponding to the smallest deterioration rate in the deterioration rate of the system calculated in the second step and the deterioration rate of the of the system calculated in the fourth step thereby;
a sixth step being performed after the first step and the second step, wherein it is determined whether processes of the first step and the second step are to be repeated; and
a seventh step being performed after the third step and the fourth step, wherein it is determined whether processes of the third step and the fourth step are to be repeated;
wherein the deterioration rate is a ratio (as herein defined) of points where reception power or quality is lower than a predetermined value within specified coverage.”

whilst claim 6 is to an apparatus comprising the various means necessary to carry out these steps.

- 4 The applicant also wished to consider the patentability of a media carrier claim, which was handed up to me at the hearing. This is to a computer program product comprising computer implementable instructions which, when implemented on a programmable computer device, realise the method above.

The law and its interpretation

- 5 Section 1(2) reads:

“It is hereby declared that the following (among other things) are not inventions for the purposes of this Act, that is to say, anything which consists of –

- (a) a discovery, scientific theory or mathematical method;
- (b) a literary, dramatic, musical or artistic work or any other aesthetic creation whatsoever;
- (c) a scheme, rule or method for performing a mental act, playing a game or doing business, or a program for a computer;
- (d) the presentation of information;

but the foregoing provision shall prevent anything from being treated as an invention for the purposes of this Act only to the extent that a patent or application for a patent relates to that thing as such.”

6 It is not disputed that the assessment of patentability under section 1(2) is now governed by the judgment of the Court of Appeal in *Aerotel Ltd v Telco Holdings Ltd* and *Macrossan's Application* [2006] EWCA Civ 1371, [2007] RPC 7 (hereinafter "*Aerotel*"). In this case the court reviewed the case law on the interpretation of section 1(2) and approved a four-step test for the assessment of patentability, namely:

- 1) Properly construe the claim
- 2) Identify the actual contribution (although at the application stage this might have to be the alleged contribution)
- 3) Ask whether it falls solely within the excluded matter
- 4) Check whether the actual or alleged contribution is actually technical in nature.

7 The operation of the test is explained at paragraphs 40-48 of the judgment. In particular:

- Paragraphs 41 and 47 explain that the test is consistent with the principles established in previous decisions of the Court of Appeal, and is a re-formulation in a different order of the approach in *Fujitsu*¹, asking the same questions but in a different order.
- Paragraph 43 states that identification of the contribution is "an exercise in judgment probably involving the problem said to be solved, how the invention works, what its advantages are"; it is essentially a matter of determining what it is the inventor has really added to human knowledge, and involves looking at substance, not form.
- Paragraph 45 explains that the third step – whether the contribution is "solely" of excluded matter - is merely an expression of the "as such" qualification of section 1(2).
- Paragraph 46 explains that, although the fourth step of checking whether the contribution is technical may not be necessary because the third step should have covered the point, it is a necessary check if *Merrill Lynch*² is to be followed.

Argument and analysis

8 Both claims 1 and 6 require an optimal tilt angle to be outputted "for use in controlling the angle of the antennas" and page 18 lines 1-2 of the specification state that the operation can be realised by a general purpose computer. On this basis the examiner maintained an objection that the claimed invention was

¹ Fujitsu Ltd's Application [1997] RPC 608

² Merrill Lynch's Application [1989] RPC 561

excluded under section 1(2)(c) as a computer program as such, being in substance an algorithm on a general purpose computer for calculating optimal tilt angles required merely to be “suitable for use” in controlling antennae. In order to circumvent this objection, he thought that it would be necessary to incorporate some form of actual antenna control into the claims.

- 9 The applicant has in fact filed a divisional application (not before me at the hearing) with claims along the lines of the examiner’s proposal. However, it thought this would not provide it with the scope of protection to which it was entitled, since it would have to rely on contributory infringement provisions against competitors who manufactured equipment but did not install it in a system containing antennas, rather than the stronger direct infringement provisions. (I observe that this problem underlies the decision in *Astron Clinica Ltd* [2008] EWHC 85 (Pat), [2008] RPC 14, one of the cases to which Mr Davis referred me). The applicant therefore still wished to pursue the claims as amended on 11 February 2008.
- 10 Although the point had not been raised during substantive examination, I notified the applicant that I would also wish to consider whether the invention was excluded under section 1(2)(a) as a mathematical method insofar as it involved no physical manipulation of the antennas.
- 11 Mr Davis argued that what was at issue was not whether the contribution fell within excluded matter, but rather what was the permissible breadth of claim. Accordingly he directed me to the exploration of this question in *VICOM* (EPO Board Decision T 208/84), *Astron Clinica* and *Halliburton Energy Services v Smith International* [2005] EWHC 1623 (Pat), [2006] RPC 2. Although I will need to consider this point, in my view it is still necessary to approach the matter on the basis of the four-step *Aerotel* test.

Steps 1 and 2

- 12 That said, I think that I can dispose of the first two steps fairly quickly. In the first step, there is no dispute about the construction of the claims. In the second step, I think that having regard to the definition of the contribution in *Aerotel* it is the calculation of an optimal tilt angle for an antenna with regard to the positions and tilt angles of neighbouring antennas in a communication system and the outputting of the optimal angle for the purpose of controlling the antenna, with the advantages that I have outlined above. I consider this to be the contribution as a matter of substance irrespective of whether the invention is claimed as a method, an apparatus or a computer program product for realising the method, and I believe this accords with the approach taken in *Astron Clinica* where Kitchin J stated at paragraph 49:

“The answer to these questions will be the same irrespective of whether the invention is claimed in the form of a programmed computer, a method involving the use of that programmed computer or the program itself. *Aerotel/Macrossan* requires the analysis to be carried out as a matter of

substance, not form, just as did *Genentech*³, *Merrill Lynch, Gale*⁴ and *Fujitsu*. True it is that the first step requires the scope of the monopoly to be determined and, in the case of a program, that will necessarily be limited. However, the contribution must still be assessed by reference to the process it will cause a computer to perform.”

Steps 3 and 4

- 13 Moving on to the third *Aerotel* step I must decide whether the contribution relates solely to excluded matter. Mr Davis accepted that the claims did not recite an actual step of setting the tilt angle to the optimal value, but thought that the contribution would be the same irrespective of whether or not the claimed method actually included a step of using the output. In his view, since the output data related to a real physical property, this sufficed to move the contribution away from the abstract and to tether it to something concrete and patentable, without it being necessary to make the use of the output an integer of the claims in the way suggested by the examiner. I will therefore now turn to the cases which Mr Davis relied on in support of his very thorough and helpful argument, and I will also consider some other cases which arose at the hearing.

VICOM

- 14 Mr Davis believed this case still to be good law in the UK and noted that it concerned both the mathematical method and computer program exclusions. The claims under consideration related to a method and apparatus for digitally filtering a two-dimensional data array which represented a stored image; as Mr Davis rightly pointed out there was no actual output step and the only tethering to the real world was the fact that the data were image data.
- 15 On mathematical methods, the Board of Appeal drew a distinction (see paragraphs 5-7 of its reasons) between a mathematical method or algorithm as *an abstract concept prescribing how to operate on numbers* (whatever they might represent) and producing no direct technical result, and *the use of a mathematical method in a technical process carried out on a physical entity* (which could be an image stored as an electric signal) by some technical means to provide a certain change in that entity; a method for digitally filtering data would remain an abstract notion not distinguished from a mathematical method unless it was specified what physical entity was represented by the data.
- 16 On computer programs, the Board (see paragraphs 12-17) took the view that, generally, claims which could be considered as a computer set up to operate in accordance with a specified program *for controlling or carrying out a technical process* could not be regarded as relating to a computer program as such. The Board thought it illogical to grant protection for a technical process controlled by a suitably programmed computer but not for the computer itself when set up to execute the control. Accordingly, Mr Davis argued, merely providing an output suitable for control was enough in this case to ensure patentability; it was not

³ Genentech Inc's Patent [1989] RPC 147

⁴ Gale's Application [1991] RPC 305

necessary actually to carry out the control.

Astron Clinica

- 17 In *Astron Clinica*, the different applicants in all the cases under consideration exploited their inventions by the sale of computer programs stored on a computer readable medium or by Internet download; the question for consideration was whether claims to the computer programs were allowable. Kitchin J concluded (paragraph 51) that where claims to a method performed by running a suitably programmed computer or to a computer programmed to carry out the method were allowable, then a claim to the program itself should also be allowable, so long as it was drawn to reflect those features of the invention that would ensure the patentability of the method which the program was intended to carry out when it was run.
- 18 Mr Davis thought that *Astron Clinica* was on all fours to *VICOM*. As he pointed out, from the summary of the various inventions at paragraphs 3-9 of the judgment, it was clear that the allowable program claims in at least the Software 2000, *Astron Clinica* and Cyan Technologies inventions would not include all the method steps or apparatus features (including computer peripherals) that would be necessary to carry out the inventive process and obtain a physical “real world” result.

Halliburton v Smith

- 19 As to what might be necessary to tie a claim to something patentable, in *Halliburton v Smith* the late Pumfrey J (as he then was) approved the approach taken by the EPO Board of Appeal in *IBM/Method for physical VLSI-chip design* (T 0453/91). There the Board held that an excluded method claim concerned with the mere design of a VLSI circuit could be saved by adding the words “and materially producing the chip so designed. Pumfrey J stated (paragraph 216):

“I have great sympathy with this approach. An untethered method claim may well cover activities which have nothing to do with any industrial activity, but if the claim is tied down to the industrial activity it becomes a valuable invention restricted to its proper sphere. What cannot be plausibly suggested is that the method is not freighted with the technical effect that is needed for patentability: but the scope of the claim should be restricted to its technical field.”;

he therefore thought that a claim directed purely to the intellectual content of a design process for a drill bit could be saved by “an amendment of the type described in T 0453/91”, without suggesting any particular wording (this not being necessary as the claim had already been found to be invalid).

- 20 I do not find this approach, which appears to regard the question of whether an invention is excluded under section 1(2) as one of claim wording, easy to reconcile with the *Aerotel* test which requires the contribution to be assessed as a matter of substance. Mr Davis pointed out that *Halliburton* was decided before *Aerotel*, and thought that *Astron Clinica* was the better authority on width of claim.

However, I note that in *Cappellini/Bloomberg LP* [2007] EWHC 476 (Pat) at paragraph 7 Pumfrey J thought it clear from *Aerotel* that the question of patentable subject matter was essentially a question of the scope of the claim.

- 21 I think the answer is to be found in paragraph 218 of *Halliburton v Smith* where Pumfrey J stated (my emphasis added):

“It might be supposed that such amendment does not affect the position as a matter of substance’, but I think this is quite wrong. The objection, in my view, is to width of claim alone *when the method has potential industrial utility*, that is, a potential technical effect. The objection to the claims *in this case* are to the form of the claim, not to the substance of the invention.”,

which I take to mean that that before any question of the width of claim arises, it has first to be determined whether the substance of the invention makes a patentable contribution.

Institut Francais du Petrole & Elf EP’s Application (BL O/201/03)

- 22 On the particular question of mathematical method, I had asked Mr Davis to address me on this decision of the comptroller in, to which reference is made at paragraph 1.17.1 of the Office’s “Manual of Patent Practice”⁵. In this case the invention was directed to a mathematical technique for optimising a stochastic model of the distribution of a parameter in a heterogeneous medium (such as an underground test drilling zone) by a series of comparisons with measured data from the medium, in order to obtain a model which best represented the medium; crucially the result of the process was produced as an image. The hearing officer (see particularly paragraphs 23-27 of the decision) thought this was distinguished from *VICOM* in that it was concerned merely with the information content of the image; *VICOM* on the other had been concerned with how the image was constructed (by manipulating data pixels, which could be regarded as an operation carried out on a physical entity).
- 23 Mr Davis thought that *Institut Francais* was akin to *Fujitsu*, but and different from the present case, in that there was abstract modelling with no potential output to control a physical process. As he pointed out, the hearing officer had based his decision on (see paragraph 24) “the absence of a functional link to a physical process, whether automatic or via human intervention”. Mr Davis thought that the present invention did indeed have the necessary link.

Gale

- 24 Mr Davis’ discussion of the case law concluded with a discussion of whether I was bound by the observation of Nicholls LJ in *Gale* that the application of a mathematical formula for writing computer instructions disposed of the contention that the claim related to a mathematical method as such (see [1991] RPC page 327 lines 40-42. As he reminded me, this was a point on which I had found

⁵ <http://www.ipo.gov.uk/practice-sec-001/pdf>

against Mr McDougall in *Benesse Corporation and anr.* (BL O/117/07) and had held that I was not so bound. However, he thought that on the authority of the above cases, and particularly *VICOM*, it was not necessary for him to rely on *Gale*; as I think he accepted, the ratio of *Gale* on this point is not altogether easy to discern.

Findings on steps 3 and 4

- 25 Whatever doubt there may be as to the extent which the broad finding in *VICOM*, that a technical effect is decisive of patentability, has survived completely unscathed by *Aerotel*, I find the passages in the Board's decision to which Mr Davis drew my attention persuasive on the limits of the mathematical method and computer program exclusions. Also, it seems to me that, there being no dispute that claims are capable of being drafted to relate to a patentable application, the dispute does indeed come down to what form of wording is acceptable and that the considerations in *Halliburton v Smith* properly come into play.
- 26 In the light of *VICOM*, *Astron Clinica* and *Institut Francais*, I am satisfied that the presence in the contribution which I have identified above of a step of outputting the optimal signal for controlling the antenna is sufficient to ensure that the contribution does not relate solely to a computer program or mathematical method. I do not think that it is necessary to go as far as including a step of actually controlling the antenna, as the examiner had argued. It seems to me that, as in *Astron Clinica*, there is force in the applicant's contention that the limitation proposed by the examiner would not give it adequate protection (although my decision does not rest on that point).
- 27 I agree with Mr Davis that I do not need to decide the matter on the basis of *Gale*.
- 28 The contribution therefore passes the third *Aerotel* step; going on to the fourth step I am satisfied that it is technical in nature.

Conclusion and next steps

- 29 It follows from my findings above that that both the claims as they now stand and the proposed computer program product claim are not excluded from patentability under section 1(2). I therefore remit the case to the examiner to continue the substantive examination, including the question of whether the description does actually support the proposed computer program product claim should that claim be proceeded with.
- 30 The applicant has extended the compliance period prescribed by rule 30 of the Patents Rules 2007 to 4 April 2008 as of right under rule 108(2), and has sought a further discretionary extension to 4 June 2008 under rule 108(3) which I accept. The applicant will therefore need to seek a further discretionary application by 4 August 2008 if the application is to proceed.

Appeal

- 31 Although the question is almost certainly academic, I note that under the Practice Direction to Part 52 of the Civil Procedure Rules, any appeal would have to be lodged within 28 days.

R C KENNEL

Deputy Director acting for the Comptroller

