



## PATENTS ACT 1977

APPLICANT Arris Enterprises LLC

ISSUE Whether patent application GB1818377.2 complies  
with section 1(2) of the Patents Act 1977

HEARING OFFICER Phil Thorpe

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## DECISION

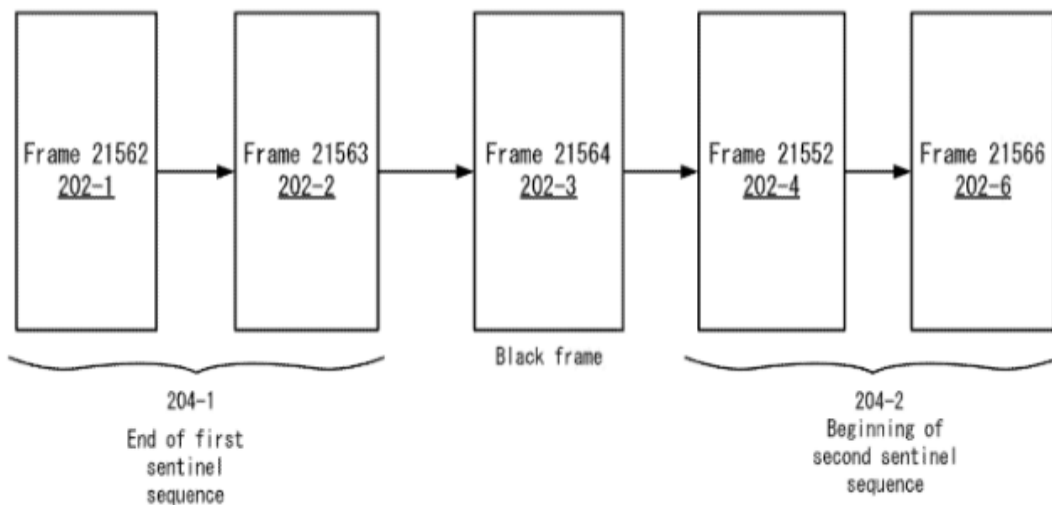
### Introduction

1. Patent application GB1818377.2 was originally filed as an international application on 11<sup>th</sup> May 2017 with an earliest priority date of 12<sup>th</sup> May 2016. After entry into the national phase, the application was republished as GB 2565249 A on 6<sup>th</sup> February 2019.
2. Despite amendments to the application, the applicant has not been able to satisfy the examiner that the application meets the requirements of the Act. In particular, the examiner remains of the opinion that the claimed invention is excluded from patentability as a program for a computer and a method of doing business as such. The examiner has deferred all other aspects of substantive examination.
3. A request that a decision be made based on the papers on file was made in the applicant's letter dated 28<sup>th</sup> April 2022. A pre-hearing report was issued on 16<sup>th</sup> May 2022.

### The Invention

4. The invention relates to methods and an apparatus for identifying sentinel frames in a video. Sentinel frames are key frames within sentinel sequences, or "bumper sequences", which signal a transition or boundary between a first type of content and a second type of content. For example, the sentinel frames may be key frames or images that may be repeatedly used to identify boundaries where program content transitions to advertisement content, where different types of ads are shown, or a segment in a show transitions to a new segment.

5. The invention involves extracting frame features for frames in a video. Then, a pattern in a sequence of frames is identified using the frame features, and this pattern can be used to select sentinel features from the sequence of frames. A back-to-back sentinel sequence pattern is shown below, although other sequences such as a one-sided sentinel frame sequence and a promotional segment sentinel frame sequence are discussed in the application. In the illustrated example, a pattern may include a first sentinel sequence followed by a transitional frame and then a second sentinel sequence. The transitional frame may be a black frame (Frame 21564) that is used to identify back-to-back sentinel sequences. Then, a sentinel frame that demarks a transition from a first content type to a second content type is identified. For example, the frames on either side of the black frame (21563 and 21552) may be very similar and be identified as sentinel frames that mark a transition from program content to advertisement content.



6. The invention also clusters the sentinel frames into groups having similar characteristics and can then produce an average of the characteristics for each entry in the group. This enables a dataset to be built up to aid future detection of sentinel frames. The dataset can be enhanced if a new group of sentinel frames is detected.
7. The claims under consideration were filed on the 3<sup>rd</sup> November 2021. Claim 1 reads as follows:

*A method comprising:*

*extracting, by a computing device, frame features for a plurality of frames from a video;*

*identifying, by the computing device, a pattern from a sequence of frames of the plurality of frames, the pattern being identified based on a pattern analysis using the frame features for frames in the sequence of frames;*

*clustering, by the computing device, a set of candidate frames into one or more groups based on the frame features for the candidate frames*

*selecting, by the computing device, sentinel features for each of the one or more groups from the frame features for frames in the sequence of frames based on the pattern;*

*generating a sentinel frame for each of the one or more groups, using the sentinel features for the frames in each of the one or more groups;*

*outputting, by the computing device, a set of sentinel frames for each of the one or more groups using the sentinel features, the set of sentinel frames identifying a transition in the video from a first content type to a second content type, wherein the sentinel frame includes the sentinel features;*

*storing, by the computing device, the set of sentinel frames in a sentinel database;*

*analyzing, by the computing device, a new video, the analyzing includes repeating the extracting, identifying, clustering and generating steps;*

*comparing, by the computing device, the generated sentinel features for the new video to the sentinel frames stored in the sentinel database;*

*determining, by the computing device, the generated sentinel frames for the new video includes at least one different sentinel frame from the sentinel frames stored in the sentinel database; and*

*updating, by the computing device, the sentinel database based on the at last one different sentinel frame*

8. Apparatus claim 20 corresponds to claim 1. There is also another method claim 12:

*A method comprising:*

*extracting, by a computing device, frame features for a plurality of frames from a video;*

*identifying, by the computing device, locations of first frames in the video using the frame features, the first frames including a first set of frame features;*

*using, by the computing device, frame features for second frames that are within a threshold distance to the first frames to generate a set of candidate frames;*

*clustering, by the computing device, the set of candidate frames into one or more groups based on the frame features for the set of candidate frames;*

*selecting, by the computing device, sentinel features for each of the one or more groups; and*

*outputting, by the computing device, a set of sentinel frames for each of the one or more groups using the sentinel features, the set of sentinel frames identifying a transition in the video from a first content type to a second content type.*

## The Law

9. The examiner has raised an objection under section 1(2) of the Patents Act 1977 that the invention is not patentable because it relates to excluded matter. The relevant provisions of this section of the Act are shown with added emphasis below:

*1(2) It is hereby declared that the following (amongst other things) are not inventions for the purpose of the Act, that is to say, anything which consists of...*

*(c) ...a scheme, rule or method for...doing business, or a program for a computer;*

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

10. As explained in the notice published by the IPO on the 8<sup>th</sup> December 2008<sup>1</sup>, the starting point for determining whether an invention falls within the exclusions of section 1(2) is the judgment of the Court of Appeal in *Aerotel/Macrossan*<sup>2</sup>.
11. The interpretation of section 1(2) has been considered by the Court of Appeal in *Symbian*<sup>3</sup>. *Symbian* arose under the computer program exclusion, but as with its previous decision in *Aerotel* the Court gave general guidance on section 1(2). Although the Court approached the question of excluded matter primarily on the basis of whether there was a technical contribution, it nevertheless (at paragraph 59) considered its conclusion in the light of the *Aerotel* approach. The Court was quite clear (see paragraphs 8-15) that the structured four-step approach to the question in *Aerotel* was never intended to be a new departure in domestic law; that it remained bound by its previous decisions, particularly *Merrill Lynch*<sup>4</sup> which rested on whether the contribution was technical; and that any differences in the two approaches should affect neither the applicable principles nor the outcome in any particular case.
12. Subject to the clarification provided by *Symbian*, it is therefore appropriate to proceed on the basis of the four-step approach explained at paragraphs 40–48 of *Aerotel* namely:

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<sup>1</sup> <http://www.ipo.gov.uk/pro-types/pro-patent/p-law/p-pn/p-pn-computer.htm>

<sup>2</sup> *Aerotel Ltd v Telco Holdings Ltd and Macrossan's Application* [2006] EWCA Civ 1371; [2007] RPC 7

<sup>3</sup> *Symbian Ltd v Comptroller-General of Patents*, [2009] RPC 1

<sup>4</sup> *Merrill Lynch's Appn.* [1989] RPC 561

- (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) *If the third step has not covered it, check whether the actual or alleged contribution is actually technical.*

## Applying the Aerotel test

### Step 1 – Properly construe the claim

13. I do not consider the claims to be particularly clear. For example, in claims 1 and 20 the relationship between the candidate frames, groups and the pattern is not clear. Nor is it entirely clear what the process of “outputting” sentinel frames involves – in particular, outputting is said to be done “using the sentinel features”, but the sentinel frames have already been generated using the sentinel features in the previous step of the claim. Whilst the examiner has deferred consideration of clarity, in their pre-hearing report and in their examination report dated 20<sup>th</sup> December 2021, they have construed the features recited by the claims as follows:

- **Sentinel sequence:** A sequence of frames marking a transition between different types of video content, such as program content and advertisement content
- **Sentinel frame:** A specific frame from a sentinel sequence
- **Candidate frame:** A specific frame indicated as possibly being a sentinel frame
- **Frame features:** Visual, audio, or textual features of specific video frames
- **Sentinel features:** Visual, audio, or textual features associated with sentinel frames

14. Using these interpretations, the examiner has defined claims 1 and 20 as relating to a computer implemented process in which:

- *Features are extracted from video frames to identify patterns in sequences of video frames*
- *A set of candidate frames is clustered into groups based on said frame features*
- *Sentinel features are selected from said groups based on the pattern*
- *A sentinel frame, either an average of observed features or a selected representative, is generated for each group*
- *A set of sentinel frames identifying a transition in the video from a first content type to a second content type is output and stored in a sentinel database*

- *A new video is analysed using the previous steps*
  - *Sentinel frames generated from the new video are compared to those stored in the sentinel database*
  - *The database is updated with any sentinel frames generated from the new video which differ from those already stored*
15. The examiner appears to have construed claims 1 and 20 in a reasonable way, and I am happy to proceed based on their interpretation of claims 1 and 20, although I have added that the sentinel features for the groups are selected based at least in part on the pattern. I note that the applicant has not disagreed with the examiner's analysis of step 1 in their correspondence.
16. The examiner has not construed claim 12, as he considered claims 1 and 20 to represent the intended scope of the invention. However, it is relevant to consider claim 12, and I have attempted to construe this claim, particularly in light of paragraphs 26 and 27 of the description, as the following computer implemented process:
- *Features are extracted from video frames to identify the location in the video of frames with certain features;*
  - *A set(s) of candidate frames is clustered into groups based on a threshold number of frames within a sequence with said frame features*
  - *Sentinel features are selected for said groups*
  - *A set of sentinel frames identifying a transition in the video from a first content type to a second content type is output using the sentinel features.*

## Step 2 – Identify the actual contribution

17. Jacob LJ addressed this step in *Aerotel/Macrossan* where he noted:

*“43. The second step — identify the contribution — is said to be more problematical. How do you assess the contribution? Mr Birss submits the test is workable — it is an exercise in judgment probably involving the problem said to be solved, how the invention works, what its advantages are. What has the inventor really added to human knowledge perhaps best sums up the exercise.”*

18. Jacob LJ also adds in paragraph 44:

*“ Mr Birss added the words "or alleged contribution" in their formulation of the second step. That will do at the application stage – where the Office must generally perform accept what the inventor says is their contribution”*

19. In their letter of 8<sup>th</sup> February 2022, and subsequently in their letter dated 28<sup>th</sup> April 2022, the applicant discusses prior problems with replacing segments of video in a video distribution system. In particular, they note the problems with existing manual processes and refer to paragraph 2 of the description as filed:

*“The sentinel sequences may be identified using one or more key frames that are manually extracted from the recorded content. For example, a user may manually view the content and identify the sentinel sequences. Then, the user needs to manually extract a frame from the sentinel sequence. This may help an ad detection system to replace the ads. However, This is a highly manual process, and it is hard to train a user to extract the correct sentinel frame.”*

20. The applicant notes that while a video stream producer, such as a television broadcaster, will be aware of the types of content present in a video stream that they output, the knowledge is typically not transmitted with the video, and so is not available to distributors within the broadcast or distribution chain. This presents a problem for content distributors that wish to replace particular segments of the video – for example, replacing advertisements or inserting a local weather forecast.

21. The applicant submits that the claimed invention presents a solution to these problems whereby sentinel frames are identified and stored in a database. The sentinel frames can be used to determine transitions between content types. This can be useful, for example, to assist in identification of a content type to be replaced.

22. Based on their assessment, the applicant has identified a broad definition for the contribution, essentially:

*“a method for identifying sentinel frames in a video”*

23. This is quantified slightly in their letter dated 28th April 2022 as:

*“a method of processing a digital video stream containing video information. The processing results in a modified system whereupon sentinel frames within the video stream are identified and stored in a database”*

24. The examiner considered the contribution to reside in:

*Identifying sentinel frames in video content;  
Recording said sentinel frames to a database;  
Comparing sentinel frames identified in new video content with sentinel frames stored in the database; and  
Updating the database to include sentinel frames not previously stored.*

25. The examiner has stated that, while the identification of sentinel frames requires video processing techniques, there is nothing in the specification which suggests that these techniques are anything but wholly conventional. Whilst some individual features in the claims – such as extracting frame features – might be conventional in themselves, I do not see how the overall method of identifying sentinel frames is conventional. In particular, the examiner does not appear to have assessed the method of identifying sentinel frames as a whole. I also note that, in assessing the contribution, the examiner does not refer to prior art – presumably as assessment of novelty

and inventive step has been deferred. Whilst the examiner has raised a general objection to novelty and inventive step previously – in their letter dated 4<sup>th</sup> May 2021 – the applicant has prima facie addressed these issues with the amended claims currently on file.

26. Therefore, I am minded to perforce accept the submission by the applicant that the (alleged) contribution resides in the way in which sentinel frames are identified in video content, particularly in light of the fact that the examiner has provided no reasoned argument or assessment to the contrary.

27. In conclusion, I consider the contribution in its broadest sense to reside in:

*“a method of processing a video, including: extracting frame features, clustering candidate frames into groups based on frame features, selecting sentinel features for the groups, and outputting a set of sentinel frames identifying a transition in the video from a first content type to a second content type using the selected sentinel features; wherein the sentinel features are selected based on identified patterns (claims 1 and 20) or the candidate frames are based on a threshold number of frames within a sequence with said frame features (claim 12)”*

Steps 3 and 4 – Ask whether it falls solely within the excluded matter and check whether the actual or alleged contribution is actually technical

28. I will consider steps 3 and 4 together.

29. Lewison J (as he then was) set out five signposts *AT&T/CVON*<sup>5</sup> that he considered to be helpful when considering whether a computer program makes a technical contribution. In *HTC*<sup>6</sup> the signposts were reformulated slightly in light of the decision in *Gemstar*<sup>7</sup>. The signposts are:

- i. Whether the claimed technical effect has a technical effect on a process which is carried on outside the computer.
- ii. Whether the claimed technical effect operates at the level of the architecture of the computer; that is to say whether the effect is produced irrespective of the data being processed or the applications being run.
- iii. Whether the claimed technical effect results in the computer being made to operate in a new way.
- iv. Whether the program makes the computer a better computer in the sense of running more efficiently and effectively as a computer.
- v. Whether the perceived problem is overcome by the claimed invention as opposed to merely being circumvented.

30. It is important to stress that these signposts are just that. They are not barriers or hurdles that need to be individually or collectively overcome by the

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<sup>5</sup> *AT&T Knowledge Venture/CVON Innovations v Comptroller General of Patents* [2009] EWHC 343 (Pat); [2009] FSR 19

<sup>6</sup> *HTC v Apple* [2013] EWCA Civ 451

<sup>7</sup> *Gemstar-TV Guide International Inc v Virgin Media Ltd* [2009] EWHC 3068 (Pat); [2010] RPC 10



applicant. They are rather a non-exhaustive list of some of the factors that can indicate in some cases whether a particular contribution may be technical.

31. The applicant has focussed their submissions on signposts (i) and (v). In particular they argue that the claimed method has a technical effect on a process which is carried on outside the computer, as it allows for the generation of information about the content of a video that is typically not available within a video transmission network. The method is said to provide a new way of generating information about the content of a video which replaces an alternative, highly manual process.
32. The examiner considers that that no manner of control is exerted by the program of the present invention on anything in the real world during or following the identification of sentinel frames or updating of the database. The examiner submits that the output of the program – identified sentinel frames – is purely abstract in nature.
33. I would note that the requirement for signpost (i) to be met is not limited to ‘controlling’ activities external to the computer. For example, the patentable invention of *Vicom*<sup>8</sup> related to digital filtering and digital image processing. Whilst I note that the claims of the invention do not go as far as replacing content in a video stream based on the identified frames, I consider that the identification of frames in a video, which are indicative of a transition from a first content type to a second content type, is not a purely abstract effect – specifically, identifying particular transitional frames in a video is a “real world” activity that is external to the computer. A computer program which provides a new way of identifying sentinel frames in video based on analysing the video itself has a technical effect on process external to the computer. Therefore, it is my opinion that signpost (i) is satisfied.
34. With regard to signpost (v), The applicant considers that content replacement is a technical problem, and that a more efficient process for implementing content replacement presents an improved technical arrangement. The examiner considers that the problem is not technical in nature and instead is concerned with general activities of content replacement, advertising replacement or the creation of content information within a video distribution chain.
35. I do not think the problem is concerned with content replacement per se. Rather the problem is about identifying frames in a video which are indicative of a transition in the video from a first content type to a second content type. This is a technical problem regarding how to get specific technical information (i.e. frames) from a technical entity (i.e. a video). The problem has been solved using the method of the claims – which involves processing certain aspects of the video itself, such a frame sequences, groups of frames, frame features – in order to identify a sentinel frame. Thus, I conclude that signpost (v) has been met.

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<sup>8</sup> *Vicom* T 0208/84

36. Therefore, I do not consider the contribution to relate solely to a computer program. Furthermore, the contribution is technical in nature.
37. The examiner also considers the contribution to reside in a business method. However, whilst the methods and apparatus may be *used* in business, for example to facilitate the replacement of advertising content, I do not see how a method of identifying sentinel frames in a video relates to a business or administrative process *itself*. Therefore, I do not consider the contribution to relate solely to a business method.

### Next steps

38. Having found that the application is not excluded as a computer program or method of doing business as such, I refer the case back to the examiner to complete consideration the deferred issues. I am conscious that the extended compliance period expired on the 4<sup>th</sup> July 2022. I will allow a further discretionary two month extension to the compliance provided the applicant files the required Form 52 and fee by no later than 4<sup>th</sup> September 2022.

Phil Thorpe  
Deputy Director, acting for the Comptroller