## Response to Ofcom's Consultation on Content Management on the HD Freeview Platform

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### Introduction

This is my response to Ofcom's consultation on the proposals by BBC Free to View Ltd ("the BBC") to amend the licensing conditions for the digital terrestrial (DTT) broadcast multiplex B ("the Multiplex B license"), as a result of a letter received<sup>1</sup> — and subsequently published — by Ofcom in September 2009 and a brief initial period of consultation aimed at industry stakeholders, but which garnered a significant number of responses<sup>23</sup> from concerned members of the public.

This response is split into two parts: the first outlines the proposal in detail, along with discussion of the merits and pitfalls of its various aspects. There then follows answers to the specific questions in Ofcom's consultation document (these answers refer to the discussion section of the document, and it is advisable that it should be read first).

<sup>&</sup>lt;sup>1</sup> http://www.ofcom.org.uk/tv/ifi/tvlicensing/enquiry/ofcom\_bbc.pdf

<sup>&</sup>lt;sup>2</sup> <u>http://www.ofcom.org.uk/consult/condocs/content\_mngt/responses/</u>

<sup>&</sup>lt;sup>3</sup> http://www.ofcom.org.uk/tv/ifi/tvlicensing/BBC\_letter.pdf

### Proposed changes to the Multiplex B License

The BBC has asked Ofcom for permission to amend the multiplex B license in order to permit it to implement a form of "content management" for high definition broadcasts on the Freeview HD platform.

This amendment would allow the BBC to broadcast some metadata in a way which can only be decoded by obtaining a look-up table from the BBC (or a partner, such as the DTLA<sup>4</sup>). This look-up table would be given out only if the manufacturer of the equipment or software agrees to adhere to certain conditions and restrictions with respect to the actions a consumer may perform in relation to that product. For example, in the case of a recording device (i.e., a PVR), consumers will not be able to transfer unencumbered recordings of "multiple copy" or "managed copy" high-definition content to "untrusted" devices (i.e., those which do not also adhere to the same set of conditions), such as laptop computers.

Another restriction is upon user modification: a hardware device or software program which gives free reign to the consumer over its operation, for example because it is based upon open source software licensed under one of the many popular "copyleft" licenses<sup>5</sup>, because the copyleft provisions would conflict with the prohibition upon user-modification.

It should be noted that the precise terms of the licensing agreement have not been disclosed publicly by the BBC, and given that they are not included in the consultation document, one can only assume that they have not been disclosed to Ofcom either.

Because of these restrictions, this proposal therefore amounts to that of the implementation of a digital rights management ("DRM") system on the Freeview HD platform<sup>6</sup>.

<sup>&</sup>lt;sup>4</sup> <u>http://www.dtcp.com/</u>

<sup>&</sup>lt;sup>5</sup> For example, the GNU General Public License — <u>http://www.gnu.org/licenses/gpl.html</u>

Copyleft licenses allow anybody to freely modify and redistribute the licensed work provided they do not restrict those who receive the distributed works from doing the same, and so on.

<sup>&</sup>lt;sup>6</sup> Although the broadcasts themselves are "in the clear", the intention is that manufacturers of consumer-focussed devices will have little choice but to engage with the licensing regime, and so the conditions imposed by that regime, which include restricting the facilities available to a consumer based upon a "flag" broadcast along with the content.

### Rationale

The basis for the request to amend the multiplex B license is straightforward: rights-holders (that is, the individuals and corporations who hold the rights to television programmes) are concerned that high-definition programming is a "hot ticket" for those wishing to distribute programmes illegally, such as on peer-to-peer networks. I should stress at this early stage that I do not dispute the concern itself.

As a result of this concern, the rights-holders have asked the BBC if a mechanism by which the ability to make unrestricted copies of high-definition broadcasts can be curtailed on a perprogramme basis. Many individuals, both from within<sup>7</sup> and outside of the BBC, have framed this as a threat from the rights-holders, rather than a request: if these measures are not implemented, they will not permit their content to be broadcast by the BBC on the Freeview HD platform.

This is, however, putting the cart before the horse somewhat. It is not the case — or rather, it *should* not be the case — that these measures are requested purely because they are demanded, and in the event that they are, it is certainly not the case that the regulator may permit them to be implemented on the same basis. To take a long-term view, it is clear that at some stage all terrestrial broadcast television in the UK will be high-definition; history also strongly suggests that once a restriction of some kind has been imposed, it is very difficult to vary at some later stage; therefore, this proposal should be set in the context not just of applying restrictions to a minority of terrestrial television output, but to the beginnings of what many (both within and outside of the television industry) hope will before too long become *all* terrestrial television output.

With this in mind, it becomes clear that such a proposal must be properly justified by its proponents, and not simply in terms of how minimal any damage might be. For example, if a restriction is imposed because of a belief that it will curtail some significantly damaging activity, is it the case that the restriction will indeed curtail that activity? If it is not, then however minimal the damage which might be caused by implementing the restriction, the measure would still amount to a net loss, both for the consumer and the industry, and this would clearly undermine the position of the regulator.

<sup>&</sup>lt;sup>7</sup> For example: <u>http://www.bbc.co.uk/blogs/bbcinternet/2009/10/freeview\_hd\_copy\_protection\_a.html#P87271029</u> Mo McRoberts — <u>mo@nevali.net</u> — <u>http://nevali.net</u>/

In this instance, the fundamental question which must be asked is as to whether implementing these measures can have any effect upon the illicit distribution which concerns rights-holders. Only when this question has been answered can it be properly balanced against any negative impact of the measures in order to draw a conclusion as to whether implementation should be permitted. In addition, although one could, as Ofcom has, draw up tables outlining the costs of various approaches, these are not matched by analysis of the related net benefits, making the kind of analysis which would be required in order to properly approve of these proposals impossible.

In order to answer this question, there are two key factors:

- whether the content which is most "at risk" would available in other international markets without similar, or more stringent, protection measures; and
- whether the proposed mechanism would hinder those responsible for illicitly distributing that content.

Employees of the BBC have stated, on several occasions, that those rights-holders who are privately the most vocal with respect to content management are those whose domestic market is the US television networks. Therefore it is important to note that the US Federal Communications Commission prohibited TV networks in the US from implementing protection measures comparable to those proposed by the BBC. Moreover, "imported" shows such as these are always broadcast in their domestic markets at least 24 hours in advance of them airing on the BBC's channels; it is trivial to demonstrate their availability on peer-to-peer networks *prior* to their broadcast by the BBC. That said, it is clear that those with concerns are not solely restricted to those based in the US — there are domestic production companies who share the same concerns.

Therefore it is important to consider whether the proposed mechanism — or, perhaps even *any* mechanism which could reasonably be implemented within the context of a public-service broadcaster — would amount to hindrance of any worth for those responsible for illicitly-distributing content.

The proposal itself hinges upon the compression of the Event Information Table (EIT), a stream of metadata used in the construction of Electronic Programme Guide (EPG) interfaces. This information would be considered critical to an ordinary user: without it, a typical set-top-box would likely be considered deficient and returned to the retailer. However, it is not critical, in the technical sense, to the reception of broadcasts. Indeed, by the admission of both the BBC and Ofcom, it could not be, as this would amount to an effective breach the "free to air" conditions under which the BBC operates.

That the EIT is not critical to the reception of broadcasts themselves is itself enough to demonstrate that a knowledgeable and determined individual (such as somebody intending to redistribute content illicitly on a peer-to-peer network) would have little difficulty in receiving and recording an unencumbered and unencrypted stream which could be moved between devices with no technical restrictions.

The concern relayed in the consultation document that manufacturers might opt to subvert the licensing process is, essentially, moot: a knowledgeable user does not require the support of a manufacturer to reverse-engineer (or otherwise obtain) the Huffman decoding table, nor to make use of broadcasts without the data from the EIT.

Despite this, it is worth exploring the nature of the Huffman coding used in order to compress the EIT data, as well as examine the effects of its implementation on the Freesat platform.

As a compression scheme, Huffman coding has two key benefits: it is well-understood (it is taught to Computer Science students across the world), and it is light in terms of its power and processing resource requirements. In other words, it is an ideal candidate as a compression scheme in low-power, low-cost environments such as set-top boxes and television receivers.

As an obfuscation or protection measure, however, it is clearly flawed from the first glance. It suffers from two major problems, one of which is a major benefit within the context of its use as a compression algorithm — that is, that it requires little processing power. Like many compression schemes, Huffman coding relies on a decoding table in order to decompress the stream to its original form. In many applications, the decoding table is supplied as part of the stream itself.

In the BBC's proposal, the corporation will hold — and consider its intellectual property — the copy of the decoding table used for the EIT as carried by Freeview HD, and will selectively license copies of it to manufacturers adhering to its terms. While on the face of it this might appear to be an effective means of controlling access to the decompressed EIT, it falls afoul of the second flaw of Huffman coding when used as a protection measure: it is trivial to reverse-engineer, especially in the situation presented here.

Huffman coding was not designed as an obfuscation mechanism, and so is particularly vulnerable to what is termed a "known plaintext attack". That is, the table can be constructed independently of the BBC's licensing regime by a third party with little difficulty because the range of content within the EIT is limited and much of the information contained within it is available through other means in some form or another.

The clearest demonstration of this weakness came about shortly after the implementation of the obfuscation scheme proposed here on the Freesat platform: the open source MythTV receiver software successfully reverse-engineered the Huffman decoding table used by Freesat shortly after it was implemented.

### Impact

Some of the effects of the rights-management system as proposed by the BBC can be predicted with a high degree of confidence. Other aspects are less definite, but have a limited range out of outcome.

From the discussion above, it is clear that the measures will have little effect upon the determined individual willing to spend relatively small amounts of money and a little more time and effort in order to access the free-to-air high definition content streams, be they with or without the EIT in a clear, decompressed form. Indeed, the popularity of the Internet means that the amount of knowledge required beforehand is lessened. There are only two ways by which this can be mitigated with any degree of effectiveness, and both would be considered draconian and most certainly outside of the remit of the regulator: one is to ban the sale and import of high definition DVB-T2 receivers for PCs (i.e., those taking the form of a USB or PCI device), as their receiving mechanism is principally software-controlled, and also standalone devices which can be repurposed by a knowledgeable user (perhaps by replacing or "reflashing" the software embedded in them). This would, unfortunately, account for the vast majority of receiving devices sold today, and this proportion would only increase as such devices are required to be "smarter". The second is to ban discussion on the Internet of the details of DVB-T2 itself.

Even if there were a feasible option, it would only effect the distribution of content which originated within the UK in the first instance, still then only until *other* devices to which high definition content can be transferred (i.e., those supporting HDCP, DTCP and AACS) were not similarly subverted.

Given that determined individuals cannot be prevented from re-distributing high-definition free-to-air content by means of technological measures applied as part of the broadcast and reception infrastructure<sup>8</sup>, these measures would in contrast be comparatively effective in preventing "the man on the Clapham omnibus" from behaving similarly. However, this raises the question as to whether such a typical consumer would be inclined to do so in the first place, and so whether imposing these restrictions would ultimately have any effect at all upon the infringement activities which concern rights-holders.

<sup>&</sup>lt;sup>8</sup> It should be stressed that this does not preclude preventing such individuals from re-distributing content through other means.

Browsing a large peer-to-peer network for television shows and films makes apparent in short order the fact that although a particular piece of content may be illegally downloaded many thousands of times, it is more often than not made initially available by one of a comparatively small group of individuals. Indeed, part of the appeal to consumers of illegally downloading files via the Internet is its low barrier to entry, so much so that the term "casual piracy" was coined to describe consumers who will from time to time illegally download files themselves, but rarely — if ever — *upload* files in return. This pattern of casual one-sided use is systemic on large peer-to-peer systems (be they principally legal or illegal by nature), and is reflected in the design of peer-to-peer algorithms whereby a file which is in the process of being downloaded will be partially shared to others (i.e., those portions of the file which have been downloaded so far will be shared to others).

Because casual piracy constitutes the vast majority of "piracy" activity occurring on the Internet, and yet requires only one person out of tens or even hundreds of thousands to make the content initially available, it is again clear that the BBC's proposal will have no effect upon its incidence.

Given that there is no particular mystery involved in the piracy patterns described here (indeed, they have been known to be the case for almost as long as illegal file-sharing on the Internet has existed), one can only assume that the BBC, at the very least, is aware of them and (*a*) has discounted them as invalid or otherwise incorrect; (*b*) has not communicated them to the rights-holders driving this proposal; or (*c*) has concerns which lie elsewhere. Of these, there is no evidence to suggest (*a*), or else it would have been presented here; (*b*) would be grossly irresponsible, given its position as a publicly-funded broadcaster, and so I am discounting it as a possibility. There remains only the possibility of other concerns, of which only one has been communicated in the consultation document: consumers exchanging copies of high definition content on physical media (such as USB sticks or Blu-ray discs).

The issue with this concern is that it is one not backed by the available facts: there is no evidence whatsoever that individual exchange of recordings of broadcasts is at all prevalent, nor any evidence to suggest that it would become prevalent as the availability of high-definition receivers and the Digital Switchover progresses. Indeed, there is no evidence to suggest that individual exchange of recordings would even come close to that during the 1980s and early 1990s where the exchange of VHS videotapes was commonplace, this despite the vastly increased fidelity of digital recordings as compared to VHS.

The reasons for this are broadly obvious, and center around convenience. High-speed connectivity means that peer-to-peer downloads require less effort on the part of a consumer than arranging a recording and exchange. Additionally, while USB sticks are widespread, the use of Blu-ray players is limited, and Blu-ray recorders even less-so. It is not by any means a foregone conclusion that Blu-ray's penetration will ever be comparable to that of DVD, and Blu-ray recorders will likely only ever be a minority market within this. Moreover, even where Blu-ray players are present, the fact that HD broadcasts are, for the medium term at least, inferior to the capabilities of pre-packaged Blu-ray discs means that the combination of convenience and superiority of the purchased item limits the appeal of individually-exchanged recordings.

There is, however, an even more fundamental reason why the individual exchange of recordings is likely to remain a niche activity, and that's the simple fact that almost everybody with whom one might exchange a recording is perfectly capable (and within their rights to) make that same recording themselves in the first place by nature of the terrestrial free-to-air platform. Thus, the set of circumstances in which individual exchange might take place are limited to those where *i*. a consumer did not, or could not, record the programme themselves, and *ii*. is outside of the iPlayer catch-up "window", and *iii*. has an acquaintance who did make the recording and is willing to supply it on physical media.

With all of this in mind, the implementation of these content-management proposals has only a single demonstrable benefit: to satisfy the whims of the rights-holders, and at this point they can reasonably be described in these terms thanks to the lack of solid justification for implementation.

The critical fact ultimately remains that there is not one single credible basis for the implementation of technological measures in order to restrict consumer activity in relation to recordings of free-to-air broadcasts carried by the Freeview HD platform, and therefore no basis by which Ofcom can legitimately approve the amendment to the multiplex B license.

Given this, the approach taken by the rights-holders — that is, to demand the implementation of these measures in order to secure agreement to carry their content on Freeview HD — is reprehensible at best and represents an insult to the British public at worst.

### Further concerns

Within this brief section I wish to lay out further — broader — concerns beyond the direct user impact.

#### Legal basis

For the absence of doubt, the below is based solely upon my own reading of the relevant laws and does not constitute a qualified legal opinion.

Provision of Electronic Programme Guide on Freeview HD

Section 310(8) of the Communications Act 2003 defines an Electronic Programme Guide as:

a service which consists of-

(a) the listing or promotion, or both the listing and the promotion, of some or all of the programmes included in any one or more programme services the providers of which are or include persons other than the provider of the guide; and

(b) a facility for obtaining access, in whole or in part, to the programme service or services listed or promoted in the guide.

Section 311(1) further states that:

The regulatory regime for every service consisting in or including an electronic programme guide includes whatever conditions (if any) OFCOM consider appropriate for securing that the code maintained by them under section 310 is observed in the provision of those services.

It is given that (*a*) the EIT metadata which it is proposed should be obfuscated forms part of the Freeview HD Electronic Programme Guide (EPG), and that (*b*) permitting or denying the obfuscation of all or part of the EPG does not fall within the conditions laid out in Ofcom's "Code on Electronic Programme Guides"<sup>9</sup>, and so does not fall within the powers conferred upon Ofcom by section 311(1) of the Communications Act 2003, except insofar as doing so may breach the Code, (*c*) the provision of the Electronic Programme Guide on the Freeview HD platform is a "licensed service" — that is, a service licensed by a Broadcasting Act license, as per section 316(4) of the Communications Act 2003, (*d*) the provision of the Electronic Programme Guide on the Freeview HD platform is a service constitutes a "service activity" operated by the BBC.

If this is indeed correct, then although it may be the case that Ofcom has the authority to vary the multiplex B license itself to allow transmission of obfuscated an EPG (in whole or part), the regulatory responsibility for permitting the BBC to transmit its EPG data in an obfuscated form rests with the BBC Trust. That is, both Ofcom *and* the BBC Trust must decide to agree to the variation in licensing conditions for the BBC to be able to obfuscate its own EPG data.

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<sup>&</sup>lt;sup>9</sup> <u>http://www.ofcom.org.uk/consult/condocs/epg/statement\_archived/statement.pdf</u>

This issue aside, there is a persistent question as to whether the inherent conflict between the non-disclosure terms attached to the use of Huffman decoding table and the copyleft provisions employed by the majority of open source DVB software amounts to a breach from the outset of the FRND terms to which the BBC and Ofcom are both committed to.

#### **Intellectual Property**

The BBC has made representation to Ofcom that it considers the Huffman decoding table to be its "intellectual property" and would potentially take legal action with respect to unauthorised distribution of this table of data.

The BBC has previously stated that this table was created by way of a comparatively straightforward process of frequency analysis upon a sample of EIT data for a particular period. This frequency analysis process is typical in the context of compression algorithms, as it is the basis by which frequently-repeated terms can be identified and related to by the compressed form.

Given this form, the only relevant form of intellectual property for which there exists the provision for legal action is that of a Database Right (as defined by the Copyright and Rights in Databases Regulations 1997).

The regulations state:

#### Avoidance of certain terms affecting lawful users

**19.** - (1) A lawful user of a database which has been made available to the public in any manner shall be entitled to extract or re-utilise insubstantial parts of the contents of the database for any purpose.

(2) Where under an agreement a person has a right to use a database, or part of a database, which has been made available to the public in any manner, any term or condition in the agreement shall be void in so far as it purports to prevent that person from extracting or re-utilising insubstantial parts of the contents of the database, or of that part of the database, for any purpose.

#### **Exceptions to database right**

**20.** - (1) Database right in a database which has been made available to the public in any manner is not infringed by fair dealing with a substantial part of its contents if -

(a) that part is extracted from the database by a person who is apart from this paragraph a lawful user of the database,

(b) it is extracted for the purpose of illustration for teaching or research and not for any commercial purpose, and

(c) the source is indicated.

(2) The provisions of Schedule 1 specify other acts which may be done in relation to a database notwithstanding the existence of database right.

Thus, the protections afforded by a Database Right is inappropriate for the stated aim — that is, to keep the Huffman decoding table a secret from all except specifically licensed users. In other words, there is no intellectual property right under current law in the UK applicable to the BBC's Huffman decoding table which provides the opportunity to take legal action against those who might make use of it in all except a particularly narrow set of circumstances.

Again, the fact that the file mythtv/libs/libmythtv/mpeg/freesat\_tables.h<sup>10</sup>, as included in the MythTV open source TV tuner application and distributed widely across the Internet, exists unhindered suggests that the ability of the BBC to keep the content of the Huffman decoding table a secret is weak, at best, even without accounting for unauthorised disclosure of the official table.

<sup>10</sup> <u>http://cvs.mythtv.org/trac/browser/trunk/mythtv/libs/libmythtv/mpeg/freesat\_tables.h</u>

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#### The BBC's Public Purpose and Values

Throughout its existence, the BBC has broadly operated on a principle by which it serves the public — and, indeed, the public is from time to time reminded that the world-renowned content and technology which emanates from the BBC is "all thanks to the unique way the BBC is funded: by you, the licence-fee payer".

Because of this, the corporation has traditionally taken a balanced view — to a greater extent than its commercial rivals might. With its core operations not subject to the same degree of commercial pressures that others are, and mindful of the fact that its viewers directly fund a significant proportion of its operating budget, accusations of arrogance are have tended to be limited to unpopular scheduling decisions (from the public) and miscellaneous cries of foul from competitors who have felt from time to time that the corporation has too great an influence over the marketplace. It is fair to say that the BBC, from the perspective of the public, has tended to fare better than most other broadcasters in this regard.

The BBC has also a firm commitment to impartiality and to avoid unnecessary bias, and this has tended to persist throughout the corporation (rather than simply being limited to compliance officers). Indeed, the lengths to which the BBC from time to time extends itself in order to avoid accusations of bias have themselves been butt of many long-running jokes and occasional criticism, although the latter is usually triggered by this lack of bias granting a platform to somebody who might be deeply unpopular.

To the seasoned observer, it is not the manner in which the BBC is funded *per se* which makes both unique and a pillar of broadcasting respected the world over. Rather, it is this combination of deep-rooted consideration for the public and of impartiality which has shaped the corporation over the last eighty-three years.

As such, it is deeply worrying to see that as content distribution technology undergoes changes — as it has often in the past — that the corporation is apparently permitting these changes to fundamentally alter its attitudes to both the public and to impartiality.

To the BBC of twenty years ago, while some within the corporation might have relished an environment whereby it — rather than a publicly-available technical specification — is able to make a determination as to which reception devices are considered legitimate and which are not, those amongst the remaining majority who did not find the notion unthinkable would at least question at what price such an environment comes.

In this case, there appears to be little to suggest, except in the strictest monetary sense, that anybody who holds positions of notable influence within the corporation did indeed do this; if they did, it is certainly not reflected in the documents which make up this consultation. It is possible that one could argue that, although the protection measures might prevent precisely nobody (who otherwise would) from redistributing protected content illicitly, and artificially restrict by way of technological measures freedoms which consumers might otherwise enjoy without causing harm or loss to any third parties, they are still worthwhile because the concerned rights-holders are strident in their beliefs to the contrary and so are placated by the implementation of these measures. However, to argue this would be a gross misapplication of Keynesian economics and would do both the corporation and the public a disservice of significant measure.

Unfortunately, this appears to be exactly the case here: the only justification for implementing these measures which holds any water whatsoever is that rights-holders are demanding them.

This represents a shift in direction for the BBC, and one which has also begun to appear in other aspects of the corporation's policies. By kowtowing to the rights-holders on the basis of what amounts to a bluff, the clear indication — whether it really is the case or not — is that the corporation has abandoned its previously-held position of astute balance. To make matters worse, this is reflected in the information the corporation supplies to the public<sup>111213</sup>, whereby the proposal is discussed first and foremost in terms of what it will *allow* (ignoring the fact that it is by definition a proposal to implement a set of restrictions), and avoiding discussion of technical details or giving answers to direct questions. Clearly, the standards to which the corporation holds its journalist, presenters and producers do not apply to statements made by its executives.

A further shift is that from arbiter of content to enforcer of rights and restrictions. Traditionally, the BBC would care little for the activities of the public which while not strictly permitted, are viewed as causing no tangible harm to the corporation's operations. The BBC would lay out, and in general the public was under no illusions with respect to, the permissions and prohibitions as applied to content that it broadcast.

<sup>&</sup>lt;sup>11</sup> http://www.bbc.co.uk/blogs/bbcinternet/2009/09/freeview\_hd\_copy\_protection\_up.html

<sup>&</sup>lt;sup>12</sup> http://www.bbc.co.uk/blogs/bbcinternet/2009/10/freeview hd copy protection a.html

<sup>&</sup>lt;sup>13</sup> http://www.bbc.co.uk/blogs/bbcinternet/2010/01/freeview hd content management.html

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In this world of enforced restrictions, the regime which underpins the relationship between the corporation, the public, and those causing the corporation harm by way of copyright infringement changes from one of presumption of innocence to one of presumption of guilt. Whereas in *C.B.S. Songs Ltd and ors v Amstrad Consumer Electronics Plc* (a ruling as relevant today as it was twenty-two years ago), it was established that the mere technological ability to infringe is not sufficient to assume in legal terms that somebody has or will, this environment of technologically-enforced restrictions disregards that principle and instead operates on the basis that the very ability to infringe is unacceptable, even if that ability is brought about by functionality which has otherwise legitimate and reasonable uses.

In terms of on-demand services, the corporation has taken these restrictions a step further: it is not limited to being an enforcer of restrictions, but it operates a closed system whereby it alone choses the platforms it considers worthy of being "supported"<sup>1415</sup>.

While it is tempting to consider both "digital" and "high definition" as deserving of special measures on a limited, short-term basis — and this has yet to be argued with any degree of clarity — it does not automatically follow that this should allow fundamental changes to the *modus operandi* of the corporation in terms of its relationship with the public.

Given that it is widely expected that on-demand services will, over time, increase in popularity to stand shoulder-to-shoulder with linear broadcast, and that high definition services will ultimately completely supplant their standard-definition equivalents, measures implemented today which affect the current minority of high-definition content, and current minority of on-demand content, will tomorrow between them affect *all* content.

It is necessary, therefore, to consider the BBC proposal to vary the multiplex B license not simply in terms of "special protection for high-definition broadcasts" (with their notional higher value, whatever effect that might have), but in terms of BBC broadcast policy as a whole.

<sup>&</sup>lt;sup>14</sup> Whereby "supported" means "authorised" and "unsupported" means "prohibited"

<sup>&</sup>lt;sup>15</sup> http://www.bbc.co.uk/blogs/bbcinternet/2010/03/bbc iplayer content protection.html

#### **Open Source**

While I have made passing mention of open source within this response, I have not made detailed explanations of how and why open source is affected by this proposal, nor why this is something which should be considered by Ofcom in its decision-making process. I shall therefore seek to do this here.

Open source software is a term used to describe any software which is distributed to others in source code form, such that the code may be read by those who receive it. In its narrowest incarnation, this is all that it permits, but even this has significant benefits because the recipient is able to gain understanding of the working of the software and, should the situation arise, diagnose problems.

Very little of the open source software distributed today is restricted to this definition. A typical set of conditions is that (a) the source code may be redistributed, (b) the source code may be modified (and the modifications — in either source or binary forms — may themselves be distributed), and (c) a recipient (and potential distributor) may not misrepresent the origins of the software.

It is important to understand that open source is built upon copyright law: it works on the basis that, according to some conditions, the rights-holder is willing to relax his right to exclusivity over his work. Commonly, this process occurs by way of an open source license which effectively automates the process: provided that you adhere to the conditions set forth in the license attached to the software, you are afforded the freedoms that it grants. To make this process easier, there are "off the shelf" licenses which save a rights-holder the expense of consulting with a legal professional before releasing their software under the terms of a particular license, and their use is widespread. One particularly well-known license, which adheres to basic set of conditions described above, is named the "MIT License", after the Massachusetts Institute of Technology where it originated as an off-the-shelf license for software developed by the university.

It is also important to note that open source itself is not a new or novel idea. In terms of computing alone, open source has existed for decades — quite likely from the earliest days of the field. However, the Internet has allowed open source to thrive, in a form of serendipitous *quid pro quo*.

Open source, by nature, fosters innovation and competition, although at first glance one might assume that largely unfettered redistribution of the "secret sauce" of computer software might achieve the opposite. Because anybody in receipt of a piece of open source<sup>16</sup> software may modify it and distribute those modifications, a piece of software may be developed by a great many different people, each contributing their own skills and experience to its development. Often, development will be organised into a structured project, where one or more individuals (typically, but by no means always, the original developers of the software) will lend oversight and direction to it. Of course, developers are free to take the project and independently develop on aspects which perhaps do not fit neatly with this direction — a situation known as a "fork" (as in, "fork in the road", reflecting the fact that development has followed more than one simultaneous path).

The massive popularity of the Internet has led to the massive popularity of open source, and vice versa. The existence of a global data telecommunications network which is rapidly approaching ubiquity allows development resources of open source projects to be pooled on a scale previously only enjoyed by largely multi-national companies: a developer in Sweden can easily co-operate with a developer in Australia and another in Canada, each bringing their own specialities to the project. This massive-scale pooling allows individual developers to focus on areas which they most enjoy (if they are working on the project in their spare time), or is most closely related to their employer's business (if they are working on the project on behalf of their employer).

For example, the BBC has brought a lot of its skill and specialist knowledge to the table in the form of the Ingex<sup>17</sup>, an award-winning open source tapeless production system which has been used in the production of well-known flagship programmes such as Dragon's Den and Eastenders. The Ingex project builds upon a number of open source projects developed elsewhere, including the Samba network filesystem (originally developed by Andrew Tridgell, an Australian developer), and an implementation of the Advanced Authoring Format which was developed by Avid. Had these projects not have existed, the BBC would have had to have either implemented them itself as part of Ingex's development, attempted to develop Ingex without them (reducing the feature-set), or worse, found that it was unable to implement Ingex within the available resources and not done so at all.

<sup>&</sup>lt;sup>16</sup> Where it is distributed according to the most common of licenses. The proportion of open source software which adheres to a "look, but don't touch" principle is so vanishingly small as to be barely worthy of mention, and indeed many in the computing industry do not even consider to be such licenses to qualify as "open source" at all.

<sup>&</sup>lt;sup>17</sup> <u>http://ingex.sourceforge.net</u>/

Just as the Internet has propelled the growth of open source, open source has propelled the growth of the Internet. The TCP/IP stack released by the University of California, Berkeley became *the* canonical implementation of Internet Protocol, and its permissive licensing terms vastly reduced the barriers to adoption by systems vendors. Now, virtually every protocol in widespread use on the Internet today has at least one open source implementation.

Open source is no longer restricted to traditional computing, however. Its popularity has meant that open source is almost everywhere in some form or another (whether as a consumer you might realise it or not).

In technological terms, computing and broadcasting have seen a great deal of convergence, even if this is yet to hold true for the broadcast medium itself. The rise of digital television means that, rather than there being simple parallels between broadcasting and computing, that it is possible to share technologies, protocols and formats. For example, the H.264 video codec which forms the basis of Freeview HD is widely used in multimedia computing, and indeed the leading software encoder, x264, is itself an open source project.

This convergence is by no means limited to the broadcast environment: it reaches right into the living room. While it was once the case that only the most skilled professional with a workshop full of equipment and a long supplier list could construct the kind of consumer electronics we were used to seeing in the home, discrete components and open source software have reached the stage where a basic DVB receiver can be constructed by nonprofessionals with off-the-shelf components and open source software. Indeed, a competent programmer with references to hand could develop the software component (that is, the portion responsible for separating the MPEG streams and decoding the video and audio) themselves given sufficient time. It is this combination of open source (with its inherent bent towards knowledge-sharing) and convergence which has made this possible.

This is not merely a fanciful romp into the realm of the hypothetical: the MythTV project is just one example of a plethora of DVB software packages which are available for both use and extension. As consumer devices become increasingly "connected" and "smart", open source is fast becoming not merely of benefit, but critical to continued innovation and competition.

While existing players in the broadcast industry are discovering that skills relating to those areas of the broadcast and reception chain which can be implemented in software are becoming steadily more widespread, the barrier to entry for new entrants would — were it not for open source — be rising at a worrying pace. As devices become more complex, the set of skills required to enter the marketplace is growing at a matching pace, to the point where without open source only those with significant legacies or vast resources might hope to compete. Thanks to open source, innovators are able to "stand on the shoulders of giants", building on the work of others and focussing tightly on the areas they believe they can compete effectively in.

One of — if not *the* — most common types of open source is termed "copyleft"<sup>18</sup>, a play on the word "copyright". Copyleft builds on copyright law and aspects of other open source licences in order to create a set of cascading conditions whereby those in receipt of a piece of software are free to distribute modified versions provided that they allow others to do the same, and so on. This is a mechanism for, in effect, forcing the software to remain open source and preventing one party from reaping the benefits of another's work without giving back to the "community".

The most well-known of all open source software licenses, the GNU General Public License (GPL), is a copyleft license. If you download a piece of open source software, there's a good chance that it is released under the terms of the GPL.

Copyleft licenses automatically conflict with agreements which seek to restrict distribution of all or part of the source code to a piece of software, such as that proposed here. In other words, it is not possible to distribute a piece of software which satisfies the GPL's requirement for availability of source and ability to distribute modified versions while simultaneously adhering to an agreement which demands non-disclosure of part of that source or prohibits distributing software which can be modified by the consumer: attempting to do so would always violate one or other of the agreements, rendering them void, which has the effect of prohibiting redistribution of the software altogether (i.e., the covered works revert to the default provisions of copyright law).

<sup>&</sup>lt;sup>18</sup> <u>http://www.gnu.org/copyleft/</u>

The imposition of a licensing regime such as that proposed here for the reception of Freeview HD broadcasts therefore precludes copyleft software from including compatible reception facilities. And, while it is true that an individual developer might chose to run the risk of legal action by reverse-engineering the decoding table (which, from the perspective of a savvy consumer or would-be illicit distributor has the effect of rendering the protections irrelevant) no commercial entity would run the risk of distributing it as part of a consumer product — such as a set-top receiver — because the risk of legal action is viewed to that much greater. Indeed, the BBC's intention to take legal action against those selling consumer devices which make use of a reverse-engineered or misappropriated decoding table.

This results in a perverse situation where devices built upon copyleft software and designed for the average consumer are precluded with the threat of legal action from either the developers of the software or the BBC, and yet the technically-savvy pirate is completely unaffected. If the aim is solely to stifle innovation and competition in the sector, then clearly it would succeed.

### Answers to Ofcom's consultation questions

## Q1: Do you agree that copy management would broaden the range of HD content available on DTT and help secure its long term viability as a platform?

No, I do not agree.

As described above, the only demonstrable positive effect of "copy management" on DTT is that rights-holders *might* permit their content to be broadcast on the platform when they would not otherwise. Whether or not the measures would be effective (which surely must be considered by the BBC and by Ofcom in the first instance) is an entirely separate issue.

Imagine, if you will, that instead the rights-holders were demanding that a free plush toy to be distributed with every piece of high-definition receiving equipment or software, because they were concerned about illicit distribution of their content. This would, of course, be viewed as a nonsensical demand, because there is no basis for concluding that the distribution of plush toys would have any effect upon the illicit distribution used to justify the request. In real terms, the BBC's proposal is no less nonsensical, and for the same reasons. Worse, though, it is of active detriment to consumers, unlike the plush toy which would be at worst wasteful.

## Q2: Do you agree that the BBC's proposed multiplex licence amendment represents the most appropriate means for securing an effective content management system on HD DTT?

I believe it is clear that "an effective content management system" is simply not achievable on HD DTT given what is achievable on the basis of the authority granted — or even likely to be granted in the future — to any or all of Ofcom, the DTLA, BBC Free to View Ltd, or the rights-holders.

Moreover, I believe it is also clear that both the BBC and Ofcom are well aware of this, as it is a logical fallacy to conclude otherwise when presented with the available facts. Given the respective roles of flagship public-service broadcaster and telecommunications and broadcast regulator, the idea that either is ignorant of this is in practical terms inconceivable.

#### Q3: Do you agree with the proposed change to Condition 6 in the Multiplex B Licence?

No, I do not. Indeed, I would consider a grave misjudgement and disservice to the British public for it to be permitted.

## Q4: Do you agree that Multiplexes C and D should be granted a similar amendment to their Licences as Multiplex B?

No, I do not.

Q5: Do you agree that the BBC's proposed approach for implementing content management would safeguard citizens and consumers legitimate use of HD content, and if not, what additional guarantees would be appropriate?

No, I do not.

The only guarantee which is appropriate is that which is already implied across DTT today: that given sufficient technical knowledge, fully-functional television reception equipment can be constructed by any party without restriction upon intellectual property or development policy, requirement of non-disclosure, and without otherwise undue hindrance.

### Q6: Do you agree that the BBC's proposed choice of content management technologies will have only a negligible impact on the cost of HD DTT receivers and their interoperability with other HD consumer equipment?

No, I do not; please see the preceding sections of this response.

Further, I believe Ofcom might run the risk of underestimate the proportion of equipment in existence which is capable of presenting or storing high-definition content and does *not* support HDCP. Clearly, this risk might be considered acceptable if it can be demonstrated that the benefits of this proposal are significant.

Moreover, the proposal here clearly precludes unfettered format/space-shifting which, with reference to the Gowers review, is a practice which does no obvious harm to rights-holders nor broadcasters. Even though shifting of standard-definition content would be permitted according to the proposal, I would be concerned that content would be encrypted and "wrapped" with some form of rights-management by default (as a matter of convenience to device manufacturers), and thus would limit its portability to devices which do not implement these particular kinds of rights-management, such as PCs<sup>19</sup> and most portable media players in circulation.

## Q7: Do stakeholders agree that the BBC's proposed Huffman Code licensing arrangements would have a negligible effect on the market for HD DTT receivers?

No, I do not; please see the preceding sections of this response.

## Q8: Do the BBC's proposed content management states and their permitted use for different categories of HD content meet the requirements of other HD broadcasters on DTT?

I have no firm opinion in relation to this question.

<sup>&</sup>lt;sup>19</sup> Irrespective of operating system or platform — a factor which is, and should remain, a matter of consumer freedom. Mo McRoberts — <u>mo@nevali.net</u> — <u>http://nevali.net</u>/

# Q9: Are there any issues that you consider Ofcom should take into account in assessing the BBC's proposal, that have not been addressed by this consultation?

Yes; please see the preceding sections of this response.