Update on Digital Piracy of Sporting Events 2011

SUBMITTED IN CALL FOR EVIDENCE TO INDEPENDENT REVIEW OF
INTELLECTUAL PROPERTY AND GROWTH

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Executive Summary

Introduction

- This report has been prepared as a follow-up to the 2008 *Background Report on Digital Piracy of Sporting Events* (which was created in connection with the OECD Phase II Study on Digital Piracy)(**"2008 Report"**).

- The intention of this report is to provide sports rights holders and their representatives with an **up to date representation of the current topography of online sports piracy**, particularly with regards to unauthorised live online broadcasts. The study outlines the principal methods of piracy used today, the major trends since the previous report, and provides details of the extent to which the reports participants suffer from these. It also highlights the methods that may be used to combat online piracy, as well as the obstacles and opportunities that may present themselves in the future.

- **30 different sporting organisations** participated in this report. Between them, the participants represent 10 different sports (Athletics, Australian Rules Football, Cricket, Football/Soccer, Golf, Motorsport, Rugby League, Rugby Union, Tennis).

- The report has been compiled by **NetResult** , a UK-based company providing intelligence, monitoring, consultancy, and enforcement services to rights holders in this area.

- Definitions for the **terminology** used in this report may be found in the appendices (see section 7.1).

Developments in streaming technology have substantially increased the incidence of online piracy of live sports events.

- In general, improvements in technology and infrastructure have resulted in **improved quality of live streaming**, making it a more appealing option to the end user. At the same time, the continuing use of P2P (peer-to-peer) software and emergence of 'UGC Live' streaming means that **the process of generating streams is far more accessible.**

- The **spread of so called "UGC Live" sites (streaming live "user generated content") and evolution of major distributors has also increased the accessibility of pirated streams**. Whereas once the audience for streaming was considered a niche market, any individual with a basic working knowledge of the internet may now locate and view unauthorised content with relative ease.

- The rise in popularity of **UGC Live sites** owes a great deal to advances in technology. In particular, the widespread use of **Content Delivery Networks (CDNs)** has facilitated the efficient distribution of material to far larger numbers of users than a practically affordable traditional unicast-based system would allow.

- The **use of P2P software remains widespread, but does not appear to have expanded at a rate that is any way comparable to that witnessed for UGC Live streaming.** There is a strong case to support the argument that P2P use remains most popular amongst experienced streamers and new users who are reasonably IT-savvy. The development of **StreamTorrent** (essentially a more efficient P2P that has been purpose built for distribution of pirated content) may prove to be an increasingly important issue for sport in the future, just as it has become been for other parts of the film and television industries.

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Combating Piracy

- The **cross-jurisdictional nature of online streaming raises complications in tackling piracy**. Individuals may register a domain in one country, subscribe to an ISP in another, and stream material for this site from a server (or CDN) in yet another country. Furthermore, inadequate provisions ensuring accurate personal details are provided during site registration can complicate attempts to trace site owners. Subsequently, **the legislative environment in any given context is relevant to efforts as a whole to reduce piracy**. Inadequate legislation or inadequate enforcement of existing legislation, in one territory will be exploited by those seeking to offer unauthorised sporting content.

- **At present, live takedown tools are the most commonly used means of expeditious removal of content** for rights holders. When effective, they offer rights holders a means of removing content directly from cooperative UGC Live sites or P2P platforms. They do however still require a constant monitoring presence on the part of the rights holder, and all the repeat costs that this entails.

- **IP Gathering**, the process of identifying the IP addresses of those viewing pirated content, may be used to bring prosecutions or enforce internet service bans on individuals (given a conducive legislative context). Similarly, **Site Blocking** (ISP Level IP Blocking) may provide a means of preventing domestic users in a given country from accessing sites based offshore.

- The **process of notice and takedown, on which much existing legislation was premised, is largely insufficient to tackle live piracy** in a satisfactorily expeditious manner.

- The **emergence of viable live fingerprinting** offers the potential for rights holders to ensure expeditious removal of content without the need for the degree of monitoring presence required in the use of takedown tools or notifications. However, at present most sites appear reluctant to adopt the technology.

- **Pressure on UGC Live sites may result in a move back towards P2P forms of streaming** for many users. Here, a trend has emerged towards limiting the visibility of and access to streams. This means that P2P streams in the future may become harder to locate, but will also have far less exposure as a result.

Findings:

Major Trends

- The **rise in popularity of UGC Live streaming** relative to P2P or traditional Unicast methods has defined the period since the 2008 Report. For most sports and events, the majority of current streaming infringements are located on UGC Live sites, although the number of such sites infringing content from the events we considered for this report varied (between 7 and 36 UGC Live sites were found to be streaming unauthorised content during the 15 competitions that provide the in-depth monitoring data, and which ran from March 2010 to February 2011)

- The popularity of UGC Live streaming is reflected in terms of both individual streaming infringements on the sites themselves and the proportion of distributors utilising UGC Live streaming as opposed to P2P.

- Subscription-based streaming sites have become relatively rare in the wake of the advance of UGC Live streaming. In general, there has been an **almost complete move towards free-to-view forms of live streaming**.

Case Study: Football

- An average of 29.9 UGC Live sites and P2P developers were found to be streaming live content across the eight football leagues and tournaments that formed the data monitoring samples. An

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average of 197.1 sites were also found to be distributing content, either through the provision of links or embedding of streams located elsewhere.

- In terms of individual streaming infringements, a range of between 96 and 16,426 UGC Live violations were recorded across the various events monitored, whilst the numbers ranged between 3 and 1,503 for P2P methods.

- UGC Live streams were based on an average of 21.8 sites, although the numbers varied from 12 to 36 in the case of the Premier League. An average of 7.6 P2P developers offered content, with numbers ranging from 1 (DFB Pokal) to 10 (Premier League, UEFA Europa League) across sample matches.

- The Premier League and 2010 FIFA World Cup South Africa™ were particularly commonly streamed on UGC Live sites. A total of 16,426 streams on 17 sites were recorded for the 2010 FIFA World Cup South Africa™, whilst monitoring thus far for the 2010/11 Premier League season has located 11,444 streams on 36 different UGC Live sites.

- Of the average 197.1 sites distributing unauthorised content, 147.1 relied primarily on UGC Live methods, whilst 50.0 utilised standard P2P technologies.

Case Study: Tennis

- For the 2 Grand Slam tournaments and the WTA Tour that formed the substantial monitoring samples, an average of 1,133.7 UGC Live streaming infringements were located across 14.7 sites. This compares to an average of 108.5 P2P streaming infringements across 19 unique URLs on 5.7 developers.

- During the 2011 Australian Open, a total of 1,958 UGC Live streaming infringements were located across 23 different sites, while 115 P2P streams were found on 21 unique URLs across a total of 5 developers.

- Though more prevalent in terms of individual streaming infringements, UGC Live methods were less popular amongst distributors when compared to other sports. Figures for the 2010 French Open and 2011 Australian Open indicate that a total of 65 distributors used primarily UGC Live content, whereas 78 used standard P2P technologies. This may reflect the growing popularity of the sport in China (or more particularly, the presence of Li Na in the women's singles final).

Case Study: Cricket

- The trend in cricket streaming fits with the wider move away from pay-per-view forms of streaming. In November 2007, pay-per-view streaming accounted for 21% of unauthorised streaming. This had dropped to less than 3% by January 2011. In common with other sports, the vast majority of unauthorised online cricket broadcasts are constituted by UGC Live streams.

- During the course of the 4 Cricket Australia events that occurred during the monitoring period, a total of 1,069 unauthorised streams were detected, whilst 1,558 were found during the 3 England and Wales Cricket Board series.

- Cricket experiences a high occurrence of distribution through the use of embedded streams on free blogging sites. Such sites are free and easy to create, and carry no penalties for abuse other than the removal of the page.

Other Sports

- Despite being free-to-air in most markets, **Formula 1** is still widely pirated. A total of 2,367 UGC Live infringements on 15 sites were reported over the course of the 2010 season (compared to 849 in 2009). 77 unique P2P streams were located on 29 unique URLs across 9 different

developers. Figures for distributors were more evenly balanced, though the majority (108) relied primarily on UGC Live streams as opposed to P2P (75).

▪ **Golf** appears to have become a more popular target for streaming since the previous report. Figures for the 2010 Ryder Cup and 2010 Open Championships ('The British Open') indicate that an average of 65.5 UGC Live streams were offered across 8.5 sites, whilst there were 23 P2P infringements on 8 unique URLs across 6 developers. As is the case with tennis, golf appears to be more popular amongst distributors using P2P technology (average of 33 sites) than those relying on UGC content (23), perhaps again reflecting the popularity of the sport in Asia.

▪ The piracy of **Rugby** has increased substantially as a result of the emergence of widespread UGC Live streaming. During matches 1-3 of the 2011 RBS Six Nations 56 UGC Live streams were located on 12 different sites. This figure is already higher than totals for the 2008 tournament. Relatively little P2P streaming has been located thus far.

Contents

1 Introduction

1.1 SROC Report

This report has been commissioned by the Sports Rights Owners Coalition as a follow up to the 2008 *Background Report on Digital Piracy of Sporting Events*. The purpose of this report is to review the current status of online sports piracy that impacts upon sports rights holders and authorised licensees. It examines the nature and extent of online piracy (including the major trends and developments) and the current methods used to combat violations, as well as looking forwards towards the opportunities and obstacles that may confront rights holders in the future. The primary focus of this report is the online distribution of unauthorised live sporting telecasts, however, attention is also given to the presence of post-event, 'archive' audio-visual material.

The report has been compiled by NetResult, an online IP rights monitoring and enforcement company, with extensive experience in analysing the landscape of piracy for rights holders.

1.2 Participants

The participants to this report are:

- o RBS 6 Nations
- o All England Lawn Tennis and Croquet Club (AELTC)
- o Australian Football League (AFL)
- o Australian Rugby Union
- o Deutsche Fussball Liga (Bundesliga)
- o Cricket Australia
- o Deutscher Fußball-Bund e.V
- o England and Wales Cricket Board (ECB)
- o Fédération Française de Tennis (FFT)
- o Fédération Internationale de Football Association (FIFA)
- o The Football Association (FA)
- o Formula One World Championship
- o International Cricket Council (ICC)
- o International Rugby Board (IRB)
- o International Tennis Federation (ITF)
- o Lawn Tennis Association (LTA)
- o Ligue de Football Professionnel
- o London Marathon
- o National Rugby League (NRL)
- o PGA European Tour
- o Premier League
- o Premiership Rugby
- o The Royal & Ancient (The R&A)
- o Rugby Football League (RFL)
- o Rugby Football Union (RFU)
- o Scottish Premier League (SPL)
- o Tennis Australia
- o Ultimate Fighting Championship (UFC)
- o Union of European Football Associations (UEFA)
- o Women's Tennis Association (WTA)

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1.3   Implications of Piracy for Rights Holders

For sports rights holders, online piracy in the form of both unauthorised live broadcasts and delayed broadcasts archived audio-visual content can have a significantly detrimental effect on areas such as revenue generation and brand image. Whereas online piracy was once understood to appeal to a relatively niche market, technological improvements and other interrelated trends have greatly expanded the accessibility of unauthorised content. Moreover, the improved quality of live streaming in particular has made it a much more appealing option to the casual sports fan. An individual with a basic working knowledge of the internet may now locate and watch an unauthorised, uninterrupted, full-screen quality sporting event on their computer (or indeed, on their television given the current trend towards integrated home entertainment systems/products)[1].

As the audience for pirated content expands, so too do the potential losses suffered by rights holders. Many have attempted to counter the threat of online piracy through the provision of legitimate online streaming alternatives, bringing their online partners into direct confrontation with the unauthorised streamers. Furthermore, though current threats to lost revenues represent serious cause for concern, the particular case of sports piracy necessarily poses specific challenges for the future that differ from those experienced by the music or film industries. If a culture of acceptance of sporting piracy emerges amongst particular demographics, then a danger persists that those young individuals who may currently seek unauthorised content due to a perceived inability to pay for subscription services may simply become unwilling to pay in the future.

Infrastructural development in many nations of the high- and middle-income world has also acted to greatly increase the global exposure to online piracy. At the same time, it is often precisely these markets that rights holders are currently targeting in the search for new audiences. According to the most recent World Bank statistics, the development of communications infrastructure in China, amongst other factors, resulted in a rise in internet users from 8.6 per 100 in 2005 to 22.5 in 2008. In that same year, the United States reported an average of 75.8 per hundred, whilst the United Kingdom showed 76.0[2]. Whilst the substantial urban/rural divide in fast-developing economies such as India and China suggests that the proportions are unlikely to reach figures comparable to the US or UK in the near future, the rapid expansion of internet access in such countries is likely to expose significant new audiences to unauthorised content in the short term[3]. Developmental initiatives in countries such as Brazil are currently seeking to expand broadband usage as a means of expanding income generating activities amongst poorer socio-economic groups. Though laudable in their immediate aims, such moves may potentially foster a culture of widespread piracy amongst those unable or unwilling to pay for subscription services at present. Consequently it is vital that such

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[1] In response to the posting of a streaming link for the UFCs 'UFC 126' event on the forum of well-known distributor website, myp2p.eu, one user commented that he was going to be "linking it to my 52" LCD".
[2] World Bank 2011. http://data.worldbank.org/indicator/IT.NET.USER.P2
[3] The China Internet Network Information Centre (CNIC) reported a total of 420 million internet users in the country as of June 2010.

development goes hand in hand with the fostering of adequate IP legislative and enforcement mechanisms.

The rapid expansion of broadband access in different global markets is likely to affect sports rights holders in an unequal manner reflecting trends in popularity of different sports and competitions across the globe. Accordingly, events which maintain and actively pursue a strong following in Asia are likely to suffer greater losses to potential revenues than would be the case in sports with a lesser following in the region.

1.4   Modes of Piracy and Revenues

Though there exist a number of modes of sports piracy on the internet, there are two key areas that demand attention: live online broadcasts and, to a lesser degree, delayed and highlights transmissions and archived content (not dealt with in this report). Whilst a significant demand for post-event content (primarily in the form of highlights) certainly exists, the importance of access to live broadcasts for the average sports fan is pivotal to their consumption of sporting content. In many ways, the immediacy of access enabled by online streaming offers the perfect solution to those seeking ways in which to contravene the restrictions that are often placed on live sporting broadcasts in their traditional television format.

Despite the more or less complete move amongst broadcasters of pirated content towards free-to-access streaming in recent years (as will be discussed shortly), it would be a mistake to assume there is little financial gain to be achieved from distributing or hosting unauthorised streams. Advertising represents a major revenue source for many pirate sites, and is the primary source for financial gain. Some sites request that users make voluntary donations towards 'operating costs' (usually through PayPal). Such activity is, however, usually confined to the major distributor sites that act as important hubs for the streaming community, although some smaller distributors who simply embed a stream or two will also occasionally do so.

On most sites, advertising is present in the form of banners or pop-ups. Many UGC Live streaming sites will also feature a video advertisement that must be played before a stream will begin (so called 'pre-roll' advertising). Common sources for on-site advertising include betting companies (and other companies offering sport-related products and services), Google Ads, and content delivered through syndicated advertising (such as that offered by AdBrite).

1.4.1   Live Streaming

The nature of live streaming has evolved over the past few years. The average user will now generally pursue different methods to consume pirated sports broadcasts than was the case at the time of the
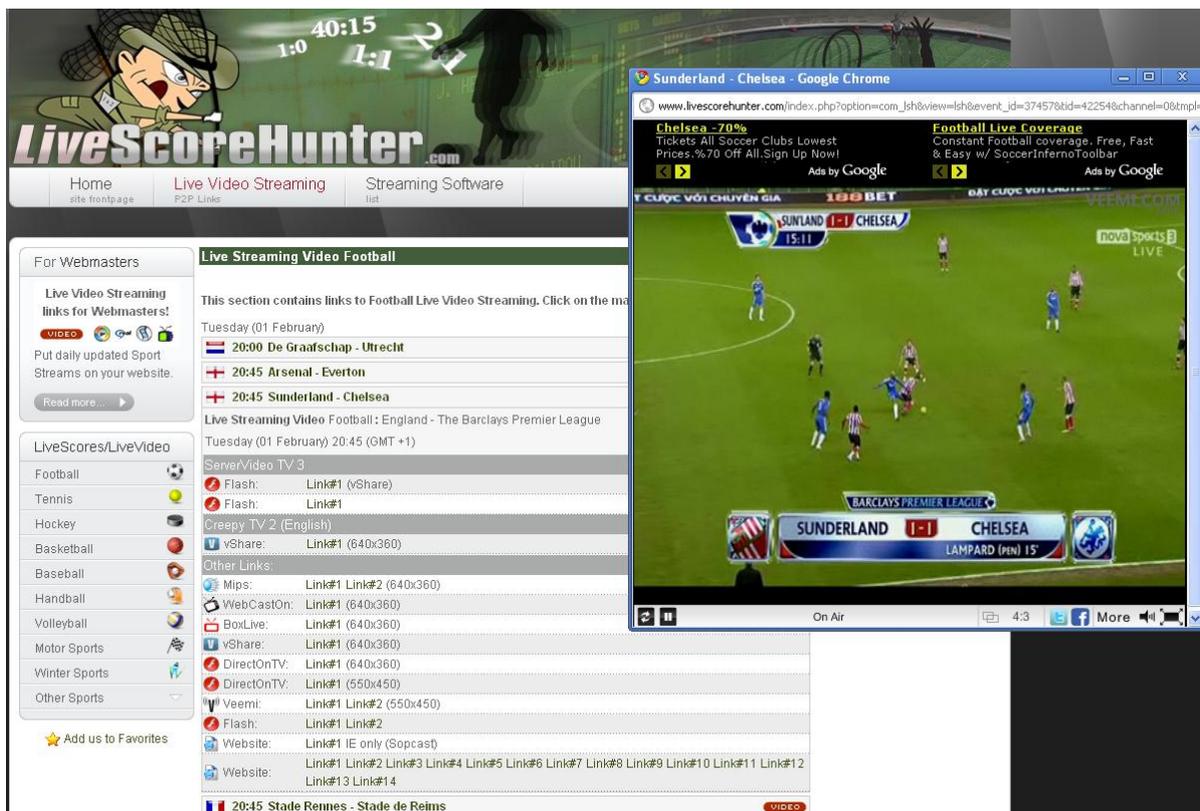
2008 Report. Users are exposed to streaming initially through word-of-mouth/social networking[4], online guides, chance exposure, or searching under their own initiative. Substantial online communities dedicated to a particular sport or streaming in general exist, many of which provide extensive guides for new users. Enquiries through online search engines related to 'live sports' will often return results (both as traditional search results and in the form of advertising) that will eventually lead the user towards such sites, often in preference to legitimate sites, with a consequent chilling effect on legitimate distribution.

A 'Distributor' site performs either or both of two functions: the provision of links to streams located elsewhere, or the direct embedding of such streams within their own website. Distributor sites are not the source of the streams themselves. Sites such as LiveScoreHunter.com or MyP2P.eu collate large numbers of links for multiple sporting events, and some are even updated during the event itself to provide the latest functioning streams.

The content available through these Distributors is at present provided by two principle methods: streams located on 'channels' on **'UGC Live Sites'**, where a user creates their own channel and is (relatively) free to decide on the content, and via **peer-to-peer (P2P)** streaming, where the user must install a software client or web browser plug-in to connect to a swarm of others who are acting as both viewers and distributers of the content. A third form of streaming also exists, in which a user must pay a subscription fee to a particular website which then generally provides a 'Unicast' feed direct from a streaming server. However, the popularity of these sites has declined hugely in the last

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[4] It is common for website operators to notify their users of new domain names via Facebook and Twitter once/if enforcement action is taken against them as happened with the ATDHE website.

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few years following the spread of P2P usage and the more recent rise in popularity of UGC Live sites, and only a small number of such sites remain. Whilst many 'UGC Live' type streams may, technically, be referred to as 'unicast'[5] (in that the content is streamed directly from single source - this is not the case with P2P) an important distinction is be made in this report between 'UGC Live' and 'Unicast' streaming. The term 'Unicast' will be used to refer to the 'traditional' forms of direct streaming as found on subscription sites, rather than to UGC Live streaming. As shall be revealed later, this distinction is an important one, as the nature of infringements and the methods of tackling them differ significantly between the two.

1.5   Current Trends and the Evolution of Piracy

In terms of live streaming, there are two significant and interrelated trends that have defined the period since the 2008 Report. These are: a more or less complete move towards free forms of streaming, and the seemingly exponential rise in popularity of streams located on UGC Live type sites relative to P2P streaming.

The spread of P2P streaming from around 2005 initially caused a reduction in the numbers of those providing subscription-based unicast streaming as users switched to the free, and often better quality, streams on offer via P2P. However, the nature of P2P technology meant that its appeal and reach was ultimately limited to the more IT-savvy users. Thus some traditional unicast sites survived on the back of glossy websites with greater exposure – such as through greater visible presence in search engine queries – than was necessarily the case for P2P streaming. Though UGC Live type sites began to

appear on the sports streaming scene from around 2007 onwards, they were initially limited in appeal due to relatively poor quality when compared to traditional unicast or P2P streaming. This was especially true for sports that involved small fast moving elements, such as the ball in golf or tennis that was hard to distinguish on lower quality streams.

Since the 2008 Report, UGC Live sites have shown significant advances in the quality of streaming on offer. Some have developed simple software 'plug-ins' of their own to aid this process, such as those required by vShare. Coupled with general technological improvements in both internet infrastructural and the equipment utilised by end users, these advances have allowed for a quality of UGC Live streaming that can regularly compare favourably to the best found through any other form of online distribution, including officially licensed broadcasts. Furthermore, the 'channels' that users are able to

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[5] Though the majority of UGC Live sites rely on direct, single source streaming, some (such as Veetle) utilise P2P software.

create on UGC Live sites in order to stream content are generally free, easy and quick to create. Aside from the occasional, simple to install software plug-in (and separate player in the case of Veetle), UGC Live sites do not require the viewer to download complicated client software. Moreover, at present none require user registration in order to watch channels. Put simply, the evolution of UGC Live sites make both the processes of streaming itself, and accessing streams, much simpler for the user. As a result, the numbers of UGC Live infringements have mushroomed over the last couple of years. Indeed, even in recent months the numbers have increased rapidly. By way of illustrating this, 7 new UGC Live sites were reported to have streamed content on UEFA Champions League matchday 7 that had not done so on matchday 6. During the 2010 FIFA World Cup South Africa™, a total of 15,235 UGC Live streams were located on 17 different sites. Thus far in the 2010/11 Premier League season[6], 36 different UGC Live sites have been found to stream unauthorised content, with a total 11,444 individual infringements between them.
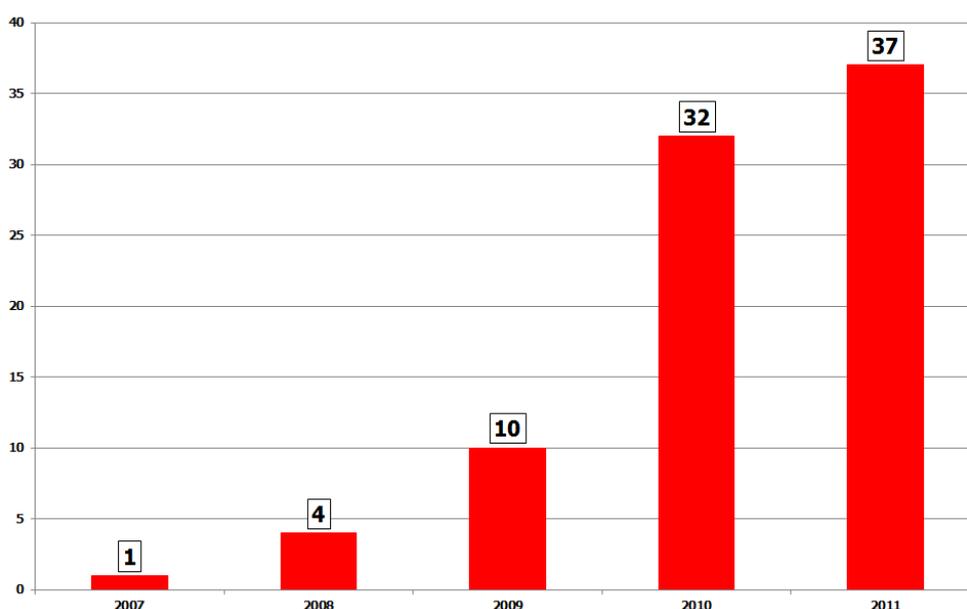
Number of Known UGC Live Sites up to February 2011

The move towards UGC Live forms of streaming has also ultimately entailed a shift towards a more commercial model of streaming in which there are substantial revenues to be accrued from on-site advertising. That some UGC Live sites are reluctant to adopt many anti-piracy measures available to them is perhaps indicative of a desire to retain an association between their sites and the availability of unlicensed content. At present, a Google search for 'live sports' returns results which place a popular UGC Live site 3rd, just above the website for a major sports broadcaster.

Though recent years have also witnessed an expansion in the availability of official online simulcast streams, these are often easily pirated. Official telecasts are regularly hacked by pirates and widely distributed. Furthermore, official streams initially attained through legitimate means are easily re-distributed through other means. Essentially, current attempts to place restrictions on official online

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[6] Data includes 2010/11Premier League season fixtures up to and including those played on 06/02/11

broadcasts are often insufficient to prevent violations. As rights holders continue to seek greater exposure and a means to provide their own alternatives to unauthorised online content, they are sometimes unwittingly providing pirates with a further source of material for re-distribution. Absent effective and enforceable mechanisms to prevent unauthorised access, there is inevitably the possibility that the proliferation of unauthorised content sourced from legitimate online services may mean that rights holders are increasing reluctant to license such rights, for fear of increasing piracy, with a dramatic effect on the market.

2   Live Streaming

The average sports fan seeks to consume sports content by viewing a live broadcast. For those looking to circumvent the restrictions that are often placed on televised or official online broadcasts, the internet presents the perfect solution. This section shall detail the principal methods and technologies that are currently used to offer unauthorised streaming content online.

2.1   Generating a Stream

Before it is distributed through one of the live streaming methods that is detailed in this section, a live stream must have a source. Most streams begin with a standard computer using a typical broadband connection. Any computer with a television tuner card installed (now a commonplace occurrence) is ready to re-broadcast signals received through everyday software applications such as Windows Media Player. Other users may connect a satellite box to their computer to achieve the same results. It is also possible to utilise software to 'capture' a stream that the user has received online from another source, and then re-distribute this feed. Official online simulcasts, protected by digital rights management can also be easily used by pirates as a source for their own streams. This may be through hacking or simply capturing and re-distributing an official stream obtained initially through legitimate means, demonstrating that whilst digital rights management tools are important, they do not provide a "silver bullet" solution to piracy. As a simple rule of thumb, if it can be seen on screen, it can be re-distributed online. P2P services such as SopCast, TVAnts and TVU offer a software download which allows the user to re-broadcast their streams within their own distribution services.

2.2   Unicast

In purely technical terms, 'Unicast' refers to the most basic form of content distribution available to streamers. Essentially, a unicast service transmits a video stream directly from a server to the viewer. Typically, the viewer requires nothing more than a standard media player (such as Windows Media Player, RealPlayer, or VLC) to then watch the stream. The process is bandwidth-intensive. As the name suggests, the broadcast is one-to-one, server to viewer. If two viewers are connected to the unicast server, two versions of the stream must be transmitted; if ten viewers are connected, ten versions; and so on. For this reason, dedicated streaming servers tend to be relatively costly to run and maintain and therefore less popular. They are often associated with sites that require subscriptions from potential viewers.

For reasons discussed in section 1.5, the traditional format of unicast-based sites has changed considerably over the years. Due to the costs involved in the provision of unicast-based streams to a large numbers of users, most of the sites that traditionally relied on the technology required subscriptions in order to view streams. As free-to-view streams have spread in popularity (both through P2P and UGC Live streaming), the numbers of sites providing streams on a subscription basis

has shrunk dramatically. Data for the 2007/8 Premier League season (during which pay sites were already in steep decline) indicated that 27% operated through user subscriptions. Thus far in the 2010/11 season, just 4 pay sites have been located offering Premier League streaming. Similarly, aggregate data for cricket streaming indicates that pay-per-view streaming dropped from 21% of total unauthorised streaming in November 2007 to less than 3% in January 2011.

The usage of the term 'Unicast' in this report will refer to those few remaining 'traditional' streaming sites that rely on unicast technology. Though some UGC Live sites utilise what may technically be termed unicast technology in their transmission of streams, the distinction between these sites and others is important as it has ramifications in the manner in which infringements are located and dealt with.

2.3   UGC Live

The emergence and rise in popularity of streaming by so-called 'UGC Live' sites has been the single most significant trend in sports streaming in recent years. Whilst 'UGC' itself is an abbreviation for 'User Generated Content', the use of this term reflects the stated primary purpose of the sites themselves rather than the creative origin of the content they often distribute. Such sites essentially purport to offer a user their own online 'channel', for the purposes of streaming their own content. The opening statements on the homepage of Justin.tv for instance invite users to "Broadcast what

you're doing". With regards to content, Justin.tv suggest that you may use the site to "share your event, class, party or thoughts, live, to anyone in over 250 countries while they chat in real-time with you and with other viewers". Subsequently, creation of a channel requires little more than a basic registration process, including agreement with terms and conditions. Following this, the user has

simply to supply a stream which is then transmitted by the site, via their CDN ('Content Delivery Network').

CDNs are, for the purposes of this report, essentially a network that operates as a much more efficient and cost-effective alternative to more traditional streaming servers. They are designed to maximise bandwidth for access to data through the strategic location of data across the network. As a result, they facilitate access to large amounts of data to large numbers of users, a task that would be prohibitively difficult and expensive through the use of traditional unicast streaming servers alone. The development and widespread expansion in use of CDNs has played a major role in the spread of UGC Live sites, allowing for greater viability of content delivery and cost. Due in part to the technical and financial requirements of setting up a commercial CDN, their operation is generally confined to large ISPs and other legitimate commercial operations.

Streamers using UGC Live sites often re-distribute an online feed they have themselves captured using software tools. Alternatively they may use a hardware based method of injection such as a direct connection from a satellite box to their PC. Following improvements and technological advances in national internet infrastructures, commercial operations (e.g. CDN development) and consumer technology, the streaming quality offered by UGC Live sites has improved dramatically over the past few years. Generally speaking, the more established operations offer more efficient content delivery than more recent sites, likely due to the higher quality of CDN subscription that their established revenue streams make viable. That said, the final streaming output of such sites is often dictated by the quality of the steam injected initially.

Aside from those relying on CDNs to distribute content, there exist UGC Live sites that have developed their own P2P applications. Most prominent in this category is Veetle, which requires the user to download its application before streams may be viewed. The use of P2P by Veetle allows the user to benefit from the increased quality in streaming that a P2P network with a large number of peers can offer (see next section for details of P2P technology).

UGC Live sites generate revenues through onsite advertising. These come in the form of more traditional 'banner' type advertising as well as pre-roll video advertisements which must often be played before a user can commence viewing a channel. Viewer numbers can be hard to gauge for UGC Live streams, though their growing popularity amongst distributors would suggest that they may attract sizeable audiences. The image to the right for example, shows a channel on Freedocast during Wimbledon 2010. The ticker to the top right of the image indicates that 2,210 live viewers were connected to the channel at the time, and that the channel had received 8,339 views since its inception.
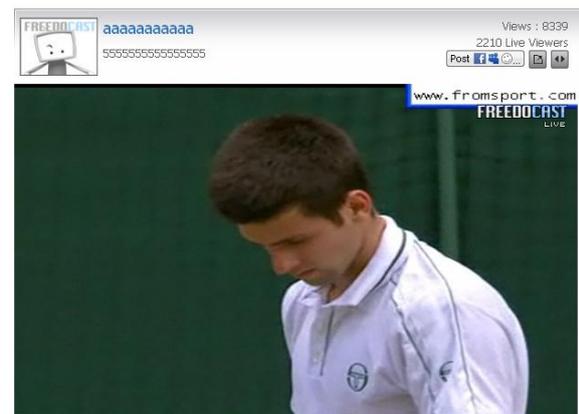
Whilst UGC Live sites have thus far been created for legitimate ends, a recent development illustrates a potentially troublesome issue in the future. Specifically, more than one recent UGC Live site appears to have been created by the same individual(s) who also operate separate streaming distributor sites. The UGC Live sites are then used to stream unauthorised content which is subsequently distributed through their other sites. The UGC Live sites that have been created are more established operators, such as Justin.tv, in that they portend to exist in order to offer users the opportunity to broadcast their own content. Since the owners of the sites appear to have established them for the purposes of unauthorised live streaming, they have proved unwilling to offer live takedown tools to rights holders. Moreover, despite the demonstrable links between the UGC Live sites and the distributors, the dispersed nature of UGC Live stream hosting means that tackling such a clear infringement is relatively difficult.[7]

2.4   P2P

Peer-to-peer, or P2P, technology is a means of distributing content through a decentralised network of peers. Each connected user (peer) offers part of their own bandwidth to other network participants to distribute information without the need for a core server (as is the case with traditional unicast streaming). Though one user is responsible for injecting the stream, each peer on the network shares responsibility for distribution. A central server, known as a 'tracker', sorts and manages the different channels, but plays no active role in the actual distribution of content. Due to the nature of the technology, P2P streams improve in quality as more peers join the network.

Most P2P programmes were developed in China, and some have gone on to become platforms for official streaming (though it is often the case that official streams will be accompanied by unlicensed material on other channels). PPTV, for example, which previously had distributed unauthorised Premier league content, is now a sub-licensee of the Premier League in China. Other rights owners have had similar experiences.

There are now essentially two main types of P2P service – those that allow users to upload streams, and those that provide only their own content. At present, the former category contains just 4 developers (SopCast, TVAnts, TVU, and StreamTorrent) and is the most popular amongst the sports streaming community in general.

As shall be discussed through the case studies below, the data indicates that P2P usage has increased only marginally since the 2008 Report, especially when compared to the rapid ascendancy of streaming on UGC Live type sites. There is a strong case to suggest that P2P usage remains popular

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[7] The jurisdictional issues involved in tackling piracy are discussed in section 3.1. Essentially the principle issue with UGC Live streaming is disputes over liability, as the sites are generally hosted by one ISP with their content streamed through a separate CDN. Both may deny responsibility for the unauthorised content on offer.
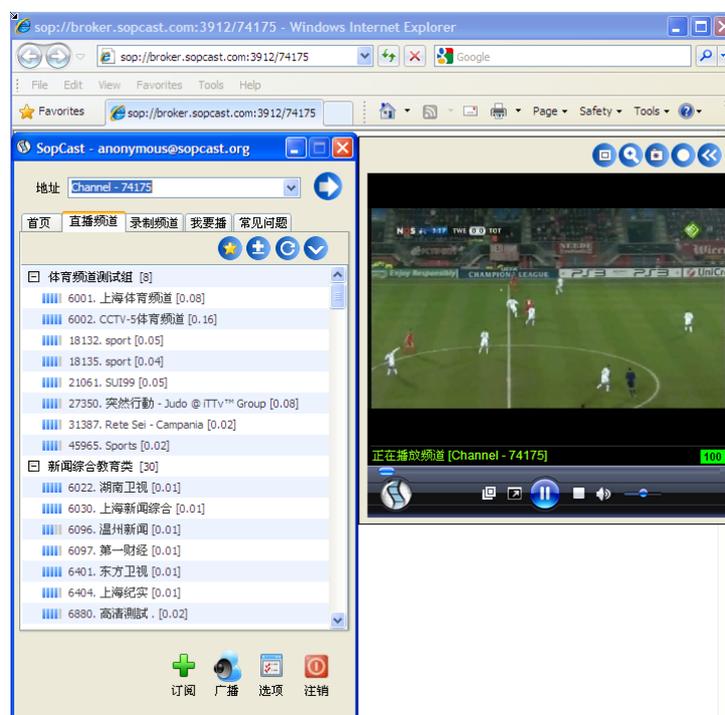
with the more experienced streamer, whilst UGC Live appeals to new users and those who are either less IT-savvy or simply unaware of the existence of P2P streaming. The reasons for this are varied, but the reliability and relatively consistent quality of a P2P stream, once attained, is an attractive feature to those who know what to look for.

2.4.1 Example – SopCast (www.sopcast.com)

SopCast is the most popular service used by the unauthorised streaming community, and operates in standalone form, as a browser plug-in, and in conjunction with Windows Media Player. The application and plug-in are available for both Windows and Linux as free downloads through the SopCast site, although streaming distributors will generally provide a link (and often an operational guide) to users on their own sites.

SopCast's developers have a mixed history when it comes to tackling piracy through the platform. In the past, the developers have collaborated with both pirates and rights holders. However, cooperation with rights holders has thus far only been forthcoming when pursued by the Chinese authorities, whose actions have in turn been driven by the relevant domestic broadcasters. Whilst such moves are not willingly undertaken by Sopcast, they do serve to demonstrate the degree of control over content that it is possible to exercise on a P2P platform if the developer is cooperative.

As is the case with most P2P streaming software, users can access sporting streams on SopCast through hyperlinks placed on distributor sites once they have downloaded and installed the application. This allows for an extremely accessible form of link sharing. SopCast-based streams may also be embedded into a webpage, and are then viewable on the site once the SopCast plug-in has been installed. Access to the SopCast tracker is available to all registered (registration is free) and unregistered users. As a result it is possible for anyone with a standard broadband connection and minimal IT know-how to stream content through the SopCast client to large audiences without the need for any access to a streaming server or CDN.

2.4.2 Example – TVU (www.tvunetworks.com)

TVU is a P2P-based online streaming application, launched in the US in 2005 with the aim of "democratizing television broadcasting". The software is available as a standalone player for Windows of Mac OS, and as a plug-in for Internet Explorer and Firefox browsers. The format allows users to create their own channels and utilise their own content. Channels are free to register as the operation

relies on advertising for revenue. Broadcasters on TVU may also accrue revenue through video advertising, which automatically target viewers based on demographics and geographies.

TVU contains genuine user generated content or licensed material streamed by broadcast partners or other TV channels/networks. However, over the course of the various monitoring periods used in this report, TVU has also streamed content from most participants on an unauthorised basis. It was, for example, witnessed streaming content on 13 of the first 17 matchdays of the current 2010/11 Bundesliga season. A live 'takedown tool' has been made available to rights holders and their representatives, allowing the instantaneous removal of unauthorised streams by those with access to the tool, although we are told that no manual monitoring of material takes place. Efficient use of the tool of course requires an active monitoring and removals effort by rights holders and their representatives for the duration of the event in question.

2.4.3 Example – UUSee (www.uusee.com)

UUSee is a new media company which provides network television and interactive value-added services for global users. One of their major funders is Steamboat ventures, an affiliate of The Walt Disney Company. They claim to offer the world's leading P2P technology, video codec technology, and deployment of distributed servers. These claims aside, UUSee has built the world's largest audio and video content aggregation and distribution platform, aiming at providing all Chinese users with high-quality network television services. Users can utilise this software to watch more than 500 channels, and more than 1000 programs for free. Among this content there are, at present, a large number of unauthorised sport streams, offering content from such events as the UEFA Champion League and Premier League.

2.5 StreamTorrent

StreamTorrent is a relatively new method of streaming which promises to deliver improved quality relative to other forms of distribution. Perhaps more importantly however, the software has been designed to make streams hard to locate. The technology is essentially P2P based, but implements

features that offer advantages to pirates compared to traditional P2P. The software has been developed with the collaboration of the online streaming community, and currently appears to be limited in popularity to the most ardent streamers.

The key difference between StreamTorrent and standard P2P technologies is the lack of the central tracker that usually sorts P2P streams. With StreamTorrent, each user (node) acts as a mini tracker themselves, holding information about neighbouring nodes that are sharing streams. The streams are identified by hash codes (a sort of serial number) meaning no real names are stored on any nodes to search for. The hash codes are simply used to identify that the nodes are sharing the same material. This means there is no central point of call for this protocol, and disconnecting a single node has very little impact on the overall streaming network.

Initially a new user would need a single nodes' IP address to join the network, which would typically have been located on a distributor site or forum. From there they will retrieve a list of other nodes sharing the same stream. Then from those new nodes they can potentially gather other nodes to expand their pool of sources to connect to. Partly as a result of the elusiveness that has been in-built into the software, it is currently difficult for foresee StreamTorrent becoming an accessible alternative to the casual user, but it is certainly the case that the advantages offered may lead to preference over other P2Ps amongst the online sports streaming community.

2.6   Simulcast

Simulcast (from 'Simultaneous Broadcast') refers to the broadcasting of an event across more than one medium, or more than one service on the same medium. For the purposes of this report, simulcast refers to licensed live online broadcasts that simultaneously accompany the televised event. Official online streams are a potential source of extra revenues to rights holders and often attractive added value to broadcasters, but they also present further opportunities to pirates. Whilst the decision to offer official content online may be seen as an attempt to provide a legitimate alternative to unauthorised streams (especially to those living in regions where no televised live broadcast of an event is offered), it is often the case that official simulcasts themselves become the source of pirated streams.

Typically a rights holder will outsource a specialist organisation to provide official streams. Such organisations tend to offer a range of services aimed at securing the stream from piracy as well as ensuring that it conforms to restrictions on distribution (such as through geo-blocking). Generally speaking, the effectiveness of these services is reflected in cost. As a result, the temptation to select a lower level (perhaps seemingly better value) security package often results in the leaking of the stream. Insufficiently secured or geo-blocked telecasts are regularly found to have been hacked by pirates and subsequently distributed. Furthermore, it is entirely possible to re-distribute an official

stream that has been received initially in a legitimate fashion, so as to bypass restrictions placed on the original. For example a user in a given country able to view an adequately geo-blocked stream freely available in their home market may then re-distribute this stream on a UGC Live or P2P feed watchable anywhere in the world.

One further means of circumventing geo-blocking restrictions is yet simpler for the end user. Through the use of a proxy server, an individual is able to effectively change their IP address. This can allow them to fool geo-blocking restrictions into identifying their location as permissible for accessing the stream. Essentially, current attempts to place restrictions on official online broadcasts are insufficient to prevent violations. As rights holders continue to seek greater exposure and a means to provide their own alternatives to unauthorised online content, they are often unwittingly providing pirates with a further source of material for re-distribution.

2.7   Accessing Streams – Distribution

A general distinction is made between those hosting streaming content and those distributing this material, although it may not be immediately clear to the casual user which is which. Distributor activity exists in two forms: collating links to streams located elsewhere, and embedding streams from elsewhere on another site. Thus to the casual observer, the latter type of activity may appear to be streaming rather than distribution. The two forms of activity are not of course mutually exclusive, and subsequently there are sites that combine a collection of links with embedded streams in other parts of the same site.

In terms of pure semantics, 'distributor' refers to the activity of a specific site in and of itself. There are distributor sites which also generate their own streams through P2P or UGC Live methods (often identifiable through a logo or bug similar to a those used by legitimate broadcasters), however the core site providing the links is still a distributor site, even if the wider activities of the site and the individuals connected with it are involved in streaming. Essentially, the important issue to note is that none of the unauthorised content available on or through distributor sites originates there.

The demand for distributor sites arises due to the fact that many streams (both P2P and UGC Live) are not searchable, or are at least very hard for the end user to locate through their own initiative. Many UGC Live sites are simply not searchable in the first instance, whereas users on other sites will often give their channel a nonsensical or non-content related name to avoid detection. Distributors thus act as an essential hub for online streaming communities and often also contain guides for streamers and viewers, as well as forums in which members discuss streaming-related topics.

Major distributor sites will generally collate a significant directory of links for a bewildering variety of live sporting events on a daily basis. Links are often searchable on a sport by sport basis, and some sites even update their lists of links in-game. The image to the left shows the different directories under which streaming listings were available at the time of writing on the website LiveScoreHunter.com. Other examples of sites providing such comprehensive listings may be found at LiveTV.ru and RojaDirecta.es.[8] These more exhaustive sites will often provide links to both P2P streaming and UGC Live, which the user can then open in a new window or through P2P client software once installed (links and information on how this may be achieved are provided when necessary on the site). The increasing prominence of UGC Live streaming means that many sites now contain a far greater number of UGC Live links than for P2P and many of the newer operations focus exclusively on UGC Live streams. Conversely, there are also sites that list only P2P links. Due to the developmental history and user demographic of P2P developers, many of these sites are Chinese language.

Embedding content from sites and sources external to the server that hosts the site itself is also a form of distributing. P2P players and UGC Live streams are relatively easy for a site owner to 'embed' onto their own website, and indeed many UGC Live sites provide a simple URL underneath a channel which is intended to aid precisely this process. Sites embedding links range from a simple blog through to those also providing the listings services detailed above. In either case, the routine presence of advertising (often for sports betting sites) on sites embedding streams suggests that these revenues represent a significant incentive for such behaviour. The image to the right illustrates embedding on a typical Chinese language P2P distributor.

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[8] Correct at the time of writing. RojaDirecta has existed on various URLs as a result of targeting by US Homeland Security.

Traditionally, free to create websites have been popular amongst those seeking to distribute through embedding. Free blogging sites have proved particularly popular for this form of distribution, as they are designed to be highly accessible. Generally, registration requirements for these sites often entails nothing more than the provision of an email address, and takes just a matter of minutes. Furthermore, there are no penalties for abuse other than the removal of the page itself, and there do not appear to be any effective measures to ensure that an individual does not simply set-up a further page (it is possible that the email address given for registration is blacklisted, however a new address is easy to attain). Subsequently, the lack of an effective deterrent and screening process means that it is a regular occurrence to see the removal of one such site promptly followed by the appearance of a new site clearly created by the same individual. Indeed, many do not even attempt to hide this, and name their pages sequentially (for example livefootballnow.blogspot.com, livefootballnow2.blogspot.com etc.).

2.7.1   Example – LiveTV.ru (www.livetv.ru)

The distributor LiveTV.ru is representative of the core group of major 'directory' type sites. At the time of the 2008 Report, P2P links tended to dominate the listings on such sites. Nowadays however the rise of UGC Live sites and related demand for more accessible streaming has meant that they now list links for both UGC Live and P2P, with the former often the most prevalent (though this will vary by sport/event). On LiveTV.ru, a distinction is made between 'Streams directly viewable in browser' (UGC Live) and 'Streams viewable using external software' (P2P).

Hosted in Russia, the site is available in Russian and English, as well as: Bulgarian, French, German, Italian, Kazakh, Polish, Portuguese, Serbian, Spanish, Turkish and Ukrainian. The variety of sports that the site offers on a daily basis is equally lengthy. For example, on Tuesday 22 February (i.e. not on a weekend) the site's schedule contained listings for athletics, basketball, boxing, cricket, darts, football, golf, handball, ice hockey, tennis, winter sports and volleyball. On 22/02/11, the schedule contained over 90 fixtures in various competitions worldwide, however the site may not have been able to locate functioning streams for all events listed.

Streams directly viewable in browser

#	Name		Rating
#1	Aliez	A	72%
#2	Veemi	V	99%
#3	Veetle	V	99%
#4	Meevos	M	93%
#5	Aliez	A	66%
#6	Veetle	V	88%
#7	WebCastOn	W	80%
#8	Veetle	V	new
#9	Veetle	V	70%
#10	Veetle	V	99%
#11	Veemi	V	75%
#12	ZoneIn	Z	92%
#13	Veetle	V	91%
#14	Mips	M	99%
#15	freedocst	F	new
#16	ZoneIn	Z	91%
#17	Veemi	V	75%
#18	Veetle	V	74%

Streams viewable using external software

#	Name		Bitrate	Rating
#19	SopCast		1328kbps	67%
#20	SopCast		564kbps	75%
#21	SopCast		1000kbps	65%
#22	SopCast		492kbps	37%
#23	SopCast		518kbps	66%
#24	SopCast			72%
#25	SopCast			77%
#26	SopCast			66%
#27	UUsee			42%
#28	UUsee			63%
#29	StreamT			87%
#30	StreamT			83%
#31	StreamT			50%
#32	StreamT			33%
#33	StreamT			75%
#34	UUsee			33%

LiveTV.ru Football Events, Tuesday 22 February 2011	
African Nations Championship	German Bundesliga
Argentinian Primera Division	German 2. Bundesliga
Australian A-League	Hungarian National Championship
Austrian Erste Liga	Italian Serie A
Belgian Jupiler League	Italian Serie B
Chilean Primera Division	Mexican Primera Division
Copa Libertadores	Polish Ekstraklasa
Czech Gambrinus League	Portuguese Liga Vitalis
Ecuadorian Serie A	Portuguese Liga Zon Sagres
Egyptian Premier League	Romanian Liga 1
English Football Conference	Saudi Premier League
English Football League One	Scottish Premier League
English Premier League	UEFA Champions League
English Premier Reserve League	UEFA Europa League

The site's revenues appear to be based on the substantial presence of traditional 'banner' type advertising. On the day of sampling, the main page of the site displayed banners linking to four different sports betting sites and one online casino, as well as a further syndicated advertisement. Such a range and combination of advertising is typical of distributor sites, from major directories such as LiveTV.ru through to sites embedding a single UGC Live stream.

3 Combating Piracy

3.1 Introduction

At present, there are a variety of strategies that sporting rights holders may pursue in their attempts to control online piracy of their content. These range from efforts aimed at the live takedown of unauthorised streams to litigation against repeat offenders and those systematically facilitating piracy. Before reviewing these methods individually, it is first important to note two key interrelated phenomenons that have bearing on the manner in which online piracy is tackled. These are: the cross-jurisdictional issues that the global internet entails, and the liability distinctions between site owners, ISPs, and CDNs.

There currently exist no broadly encompassing global restrictions on where an individual may purchase internet hosting services for their website or other data. For example, this means that a person living in Germany may be running a website that is itself hosted physically on servers located in Russia or the USA. He may also chose to register the domain through a US-based proxy-registration company (to hide his identity), which may give the impression that he is operating from within the USA. To complicate matters further, the actual content streamed on UGC Live sites may be located on a Content Delivery Network[9] that may be owned by another ISP, in a different country to that which hosts the website (this is also the case for the streaming servers used by unicast sites). As a result, it is often very hard to ascertain who exactly is running the site, and from which country.

The example of the distributor website IraqGoals.net is a good example. The site was registered by proxy in the USA to a false address in Iraq. The site itself was hosted by an uncooperative ISP based in Sweden embedded streams hosted on 3rd party sites (primarily UGC Live sites), and was in many cases likely responsible for the creation of various streams in the first instance. An error by the site owner exposed an address in Australia as the likely whereabouts of the site owner himself, and subsequently a private investigator was hired to confirm the presence of the operator and incriminating equipment at the address. Following this, the Australian Federal Police attained approval to raid the suspect's property, uncovering a substantial amount of streaming equipment in the process. The individual has since cooperated with police in the enquiries and the site has been offline since 18th September 2010. Whilst this case was concluded satisfactorily, it was only as a result of an error by the site owner that his real whereabouts became known. The ISP, in common with other uncooperative ISPs, would never have willingly disclosed any of the personal information required to bring a prosecution.

3.2   Online Action & Communications

3.2.1   *Live Takedown Tools*

A live takedown tool is an application on a site or a P2P developer that allows confirmed rights holders and their representatives to remove content directly. The development of such tools may often entail collaboration between a site owner and rights holder (often following substantial pressure from rights holders), or may be a condition of service dictated by a Content Delivery Network. When set-up properly, these tools allow the instantaneous removal of live content, and represent progress in a wider environment that is increasingly defined by greater ease and accessibility for those seeking to generate and distribute streams.

The development of UGC Live takedown tools in particular has had a noticeable effect on the pattern of UGC Live streaming popularity. The immediate impact of a takedown tool may in fact be to increase the number of channels set-up on a given site as users seek to replace those shut down. However, persistent use over time results in frustration on the part of streamers, who will then often
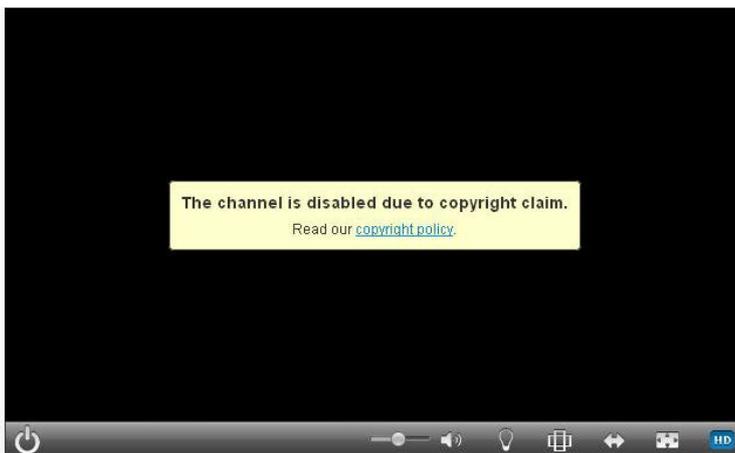
alter their preferred UGC Live site, switch to an alternative method of content delivery, or decide to cease their activity altogether. Those choosing to find an alternative UGC Live site will typically attempt to find one which is not known (within the streaming community) to offer live takedown services. It is not uncommon to find discussions on distributor site forums, or other sites popular with the streamers, in which individuals exchange information on which sports are being policed on which sites.

A comparison of data from the 2010 and 2011 Australian Open illustrates the long term trend accompanying takedown tool adoption by UGC Live sites. During the 2010 event, 882 UGC Live streams were located in total. Two sites in particular accounted for 507 streams, or 57.5% of the total. In 2011, these same two sites provided just 43 of the 1,958 UGC Live streams located during the event (or 2.2% of the total). Whilst an increase in the numbers of UGC sites available to streamers is surely also a factor in this migration, the fact that takedown tools are now widely used for removal of sporting content on both sites has likely acted to push streamers towards seeking alternatives. A similar phenomenon was observed during the 2010 Formula 1 season, whereby the distribution of UGC Live streams changed dramatically over the course of the championships. For the first 4 races of the season, 5 sites contained all UGC Live infringements. By the 8th race, 8 sites contained infringements. By the 13th race, a total of 15 different sites contained UGC Live infringements. Three

of the original five sites offered takedown tools, and the numbers of infringements present on these sites reduced substantially as the season progressed.

At present, around 40% of known UGC Live sites containing a significant amount of unauthorised live sporting content offer takedown tools to rights holders. Whilst a few of those that do not offer tools do respond promptly/intermittently to notifications, the remaining sites either react extremely slowly to takedown notifications or are wholly uncooperative.

3.2.2   P2P – IP Gathering

IP Gathering (or 'IP-harvesting') refers to the process of identifying and recording the IP addresses of users watching unauthorised content. The process is most viable as a means of determining viewers connected to a P2P stream. This is due to the nature of data sharing in a P2P network, which operate by allowing the users (nodes) to connect directly to other nodes who are all in turn sharing the same content (see section 2.4). Thus, if the network activity of a single node is monitored over a short period of time, it is possible to determine all IP addresses of the other nodes with which it has communicated (once other packets have been filtered).

This process may be used to ascertain the location of each IP address, how much data had been downloaded/uploaded by the user, and how long the IP address was connected for. Given a conducive legislative environment, the technique may also be used by ISPs to identify and penalise customers acting in breach of copyrights.

Due to the nature of P2P technology, those watching streams are also sharing information with others. Viewers are also streamers. When using the IP-gathering process to collect information on who is sharing, you inherently also have a list of a subset of users receiving the data (i.e. it is the same list - each peer node sends and receives). This information would only be available via direct access to the multitude of server logs for non-P2P technologies (e.g. through access to the server logs of a UGC Live site). This therefore effectively deprives a rights holder of any kind of legal remedy in respect of those viewing non-P2P content.

3.2.3   C&Ds / notifications

The use of pre-agreed 'Cease-and-Desist' letters has been the orthodox approach taken in IP rights enforcement for a significant period of time. Typically, such notifications will be emailed to a site owner and their ISP (the company providing the hosting services for their site) once an infringement has been located and verified by a rights holder or agent acting on their behalf. If prompt cooperation is not forthcoming from the site owner, the ISP can be contacted directly, made aware of their liabilities, and requested to suspend services to the account in question. It was through the process of notice and takedown that most existing internet-relevant IP legislation was envisaged as operating.

Compliance with such notices on the part of site owners varies. Though individuals may profess ignorance, the increasing prominence of copyright disputes in the online world would suggest increasing awareness of what may or may not constitute an infringement. That said, it is ultimately often the existence of adequate legislation in the territory in which a site's ISP is located, rather than the disposition of the site owner, that proves crucial in deciding the outcome of the notification.

Distribution (in the form of links or embedded content) is one area in which notifications may have mixed success, due largely to the ambiguities surrounding contributory infringements. Subsequently, it is important that legislative developments and legal cases continue to seek clarification (or establish further precedents) on the issue of contributory infringements.

3.2.4   Site Blocking

There are a number of effective methods that can be employed with relative ease by an ISP to prevent their subscribers accessing a particular website. The term site blocking is therefore a generic term that encompasses a number of distinct technical measures.

DNS name blocking using Domain Name System (DNS) operates by associating a DNS name (i.e. the web address of the site) with the IP address that an ISP uses to route subscriber communications to the web server that is operating that particular website. A user's computer automatically calls upon DNS servers operated by the user's ISP to look up the DNS name that corresponds with the relevant website. This process enables the user's computer to address communications to the particular website using the IP address in question. DNS blocking is achieved by the ISP removing or modifying the IP address records for the DNS name in question. The effect of this removal is that the ISP either returns no IP address when the DNS name is entered.

IP address blocking is a basic filtering concept where the routing equipment run by the ISP is set to either "null route" the relevant address, or redirect it to a different machine. This means that any internet traffic going through the ISP's routers that is destined for the blocked address is either discarded (and therefore fails) or is redirected to another address set by the ISP.   By blocking subscriber communications to the blocked website in this way, the IP address is effectively rendered inaccessible. The potential advantage of directing to an alternate address is that the request can be processed to a site that explains that "Access to this address has been blocked due to…"

DPI-based URL blocking is required in cases where the website to be blocked shares an IP address with another website which is not to be the subject of any blocking action. The mechanism can also be used to block a particular part of a website. This form of blocking involves the ISP configuring its network management system to monitor traffic and block a subscriber's connection to specified URLs as defined by the ISP. This mechanism can also be used to implement IP address blocking as an alternative to the router method already described.

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ISPs already commonly use the above techniques to block access to material identified by the Internet Watch Foundation.

3.2.5 Geo-Blocking

Geo-Blocking is a function of the mapping of a user's IP address to a geographical location. Several companies exist that provide a service to software developers where, given a specific IP Address, return geographic information (from just "Country" down to "City" levels). In the vast majority of cases, this process provides a very effective method of locking access to content down to specific countries/regions. At present the technology is used primarily to apply restrictions on official content.

The two main problems that geo-blocking currently experiences are incorrect matching and bypassing. Incorrect matching occurs when IP addresses do not correlate to actual physical addresses. Addresses are generally dynamically allocated to home users at the time they connect to the internet from one of many pools of addresses currently assigned to an ISP. The matching process required to estimate the geolocation of a user is primarily based on information determined from the entity to which the block of IP Addresses has been allocated. As many ISPs are multi-national (or are part of larger holding companies that are multinational), they can (and sometimes do) re-use and route IP addresses across borders depending on their needs at the time. This can cause some mis-matching. In fact, it is not rare for competing geo-location determining companies to disagree on the actual location.

Bypassing generally occurs when users "tunnel" through proxy servers or connect to public VPN (Virtual Private Network) services. This in effect is like having a remote machine (in a totally different geolocation) access the relevant service on your behalf, and seamlessly forward the data back to you. This isn't always a deliberate act by the user and might inadvertently happen when a travelling businessman accesses their office network via a private VPN in order to read their email/view their private Intranet, for example. Whilst they are connected, this can cause all of their network traffic to flow through that VPN with the effect being that a US businessman sitting in the UK accessing the home office network via the VPN will appear to be in the US.

3.2.6 Fingerprinting & Watermarking

Digital video fingerprinting utilises special algorithms to extract and compress characteristic components of a video feed. This creates a digital 'fingerprint' that may then be used to automatically locate any video content matching this fingerprint. Digital watermarking, on the other hand, is a technique premised on inserting an identifiable marker into the content. This is not necessarily as conspicuous as a broadcaster logo/bug, and may not be readily perceptible to the average user. On a basic level, the primary difference between the two is that watermarking relies on the content being changed on some level prior to distribution whereas fingerprinting builds an 'image' from an unadulterated version of the material.

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Initial developments of fingerprinting technology were of relevance only to post-event content and are used in such roles as automated removal of copyrighted material from UGC sites. However, advances in software have enabled the use of a live fingerprinting process, creating the possibility of automated content screening on UGC Live sites. Given that many UGC Live sites are not searchable, or that streamers actively attempt to hide their streams from those searching the site itself, the technology could prove an important tool to permit the removal of unauthorised content from participating sites. And of course numerous websites merely refuse to offer a fingerprinting solution or cooperate with rights owners or the technology companies.

Watermarking, on the other hand, is perhaps better suited to post-event content rather than it is for live. This is due to the difficulties inherent in verifying watermarks in real time. While this is a problem for which a technological solution is likely plausible in the near future, it remains the case that fingerprinting may represent a far more viable solution at present.

3.2.7   Attacking Revenue Streams

Whilst subscription-based streaming sites have all but disappeared, the heavy presence of online advertising as well as donations from the streaming community can still generate financial incentives for individuals to continue streaming. In the past, the need to use online payment methods by subscription-based sites presented rights holders and their representatives with a clear means of attacking the very source of the funds upon which the presence of the sites was premised. Third party payment systems such as PayPal were often willing to suspend the accounts of those engaged in piracy once notified of their actions. Whilst similar tactics may be used nowadays to target the means by which sites accept donations, a different approach is required in order to tackle the regular presence of advertising on which most contemporary sites base their revenue model.

3.2.8   Archive Content Removal

The removal of archive content generally entails a combination of notifications and takedown tools. Increasing attention to the volume of unauthorised content on major UGC sites has led to the recognition of the need to provide rights holders and their representatives with more efficient means of reporting removals than through traditional email-based reporting. The result has been the development of takedown tools which allow agents acting on behalf of confirmed rights holders to remove material directly themselves. Typically, a privileged account is created which adds features to the usual site browser enabling the user to select clips for removal that contain copyrighted content.

3.3   Legislation and Regulation

Owing to the complex global distribution of relevant jurisdictions for tackling online copyright abuses, the legislative environment in any given domestic context is relevant to efforts as a whole to reduce

the piracy of sporting content. Subsequently, a lack of effective legislation, or inadequate and inconsistent enforcement of existing legislation, in one territory can and does lead to the digital migration of those seeking a safe haven from IP enforcement. Such shortcomings are by no means necessarily limited to countries with weaker or less developed/established institutions. Indeed, some of those that acted earlier than others in the creation of internet-relevant IP legislation have recently found that the pace of change has rendered existing provisions inadequate or even unfit for purpose.

In the **United Kingdom**, the introduction of the Digital Economy Act remains delayed by judicial review following objections by two of the UK's largest ISPs. The Act seeks to ease the process of actually locating and prosecuting persistent offenders, as well as suspending the connections of those sharing content. Under the provisions of the Act, rights holders would be permitted to gather the IP addresses (see section 3.2.2) of individuals whom they believed were infringing on their copyrights. These would then be sent to the relevant ISP alongside notification of their activity. ISPs would be required to keep a record of those (anonymously) that had reached a pre-agreed threshold of complaints[10], and to submit these lists to rights holders on request. The rights holder could then attain a court order to identify the individuals and initiate a prosecution if desired. Additional stipulations would also allow for the creation of further legislation that would in turn permit the use of injunctions by rights holders to induce ISPs to block access to sites infringing on their rights, whilst IP gathering for the purposes of suspending the internet connections of individuals would also be permissible. At present however, the DEA would only permit screening of P2P-based distribution and would not provide a useful tool for locating individuals streaming content via UGC Live sites. Furthermore, under current proposals, rights holders must sign-up in order to have their content filtered, and would thus continue to bear some of the costs of having their rights secured.

In **France**, the introduction of the HADOPI[11] law in 2009 has altered the domestic environment to the benefit of rights holders. Essentially, the act has created a new regulatory authority (HADOPI) as well as a requirement that service providers screen content and adopt a '3-strike' system for those illegally exchanging copyrighted material. Those subjected to a suspension of connection may expect this to last for a duration of between 2 months and a year and will be blacklisted from signing-up to new subscriptions in the meantime. Unlike the Digital Economy Act in the UK, HADOPI screening is envisioned as extending to the full extent of online activity rather than P2P-based file sharing alone.

In **India**, the long-awaited Copyright Bill 2010 was introduced to Parliament in April, and subsequently referred to a Standing Parliamentary Committee which requested submissions from stakeholders for review. In November 2010 the Committee released their views, agreeing with some opinions expressed but, according to the International Intellectual Property Alliance (IIPA), failing to adopt many desirable suggestions. The report is not binding on the Copyright Office in the MHRD and it is

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[10] The precise threshold will be left to the relevant regulatory authority to decide.

[11] Full title: *Loi favorisant la diffusion et la protection de la creation sur Internet* or the 'law promoting the distribution and protection of creative works on the internet".

currently unclear what changes may be made to the Bill as a result. In its present form, the IIPA argue that the Bill "does not deal adequately with the issue of online infringement and the role to be played by ISPs over infringements of third parties"[12]. The current Information Technology Act, 2000, does contain provisions that ISPs bear responsibility for infringements on their networks after having been put on notice (though the exact details and procedure remain too ambiguously defined and exceptions too broad), and it is argues that the Bill should be brought into line with such measures.

Though online piracy on ISPs based in the **Russian Federation** remains a key issue for rights holders, it appears to be a low priority for the domestic authorities. According to the IIPA, the fundamental inadequacy is the lack of authority and jurisdiction, with "little, if any" proactive action taken by the government over the past three years. More worryingly, the IIPA reports that notions circulated in 2010 as private drafts to amend the copyright law included provisions to "(a) exempt from copyright liability all third parties – including ISPs even if a piracy problem resulted from the ISPs own design and making, and (b) excuse almost all online infringing activity as "private" copying".[13]

Malaysia is another territory in which piracy has traditionally represented a strong threat to rights holders. This situation owes much to the lack of an adequate legal infrastructure which would induce responsibility on the part of service providers. However, current developments offer the promise of a much improved legislative environment for tackling infringements in the future. In December 2010, a new Bill proposing amendments to the Copyright Act 1987 was tabled for the first reading in the lower house of Parliament. Though the Bill still contains some troublesome provisions[14], it should go some way towards encouraging the active cooperation of ISPs with rights holders. Towards this end, the Bill contains provisions including but not limited to a requirement that the accounts of repeat infringers be suspended. In considering the amendments, the IIPA concludes that, "as currently drafted, the Bill addressed provisions related to service provider liability for various infringing activities occurring over its services".[15]

Recent developments in **China** also offer some cause for optimism for rights holders, though no doubt there is still much room for improvement. In January 2011, the Supreme Court, the Supreme People's Procuratorate, and the Ministry of Public Security issued and made effective their 'Opinions' on the current state of IP protection in the country[16], following an Intellectual Property Strategy issued by

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[12] International Intellectual Property Alliance (IIPA), *2011 Special 301 Report on Copyright Protection and Enforcement: India.* http://www.iipa.com/rbc/2011/2011SPEC301INDIA.pdf

[13] International Intellectual Property Alliance (IIPA), *2011 Special 301 Report on Copyright Protection and Enforcement: Russian Federation.* http://www.iipa.com/rbc/2011/2011SPEC301RUSSIA.pdf

[14] Notable provisions include recognition of the concept of an "innocent infringer" which denies damages to individuals who had reasonable grounds for not suspecting their behaviour constituted an infringement.

[15] International Intellectual Property Alliance (IIPA), *2011 Special 301 Report on Copyright Protection and Enforcement: Malaysia.* http://www.iipa.com/rbc/2011/2011SPEC301MALAYSIA.pdf

[16] Supreme People's Court, Supreme People's Procuratorate, and Ministry of Public Security, *Opinions of the Supreme People's Court, the Supreme People's Procuratorate, and the Ministry of Public Security on Some Issues Concerning Application of Law in Handling Criminal Cases of Intellectual Property Rights Infringement, Promulgated and Effective on January 10, 2011*

the State Administration of Radio, Film and Television (SAFRT) in November 2010. With regards to online infringements, the Opinions provided some much needed clarification on activity that constitutes a criminal act, and may prove important in establishing a deterrent through criminal prosecutions. In China, it is required to establish that activity has been undertaken "for the purposes of making profits" in order to bring a criminal prosecution, and Article 10 of the Opinions provide clarification in this matter. Importantly, it is recognized that 'publishing non-free advertisments' on pages that contain unauthorised material constitutes such behaviour. This means that a website cannot claim that a lack of direct charges for viewing their content axiomatically proves that they are not making profit from their activity.

Article 13 of the Opinions attempts to provide a more viable means of ascertaining if a site meets the infringement threshold required for a prosecution. Previously, the degree of lost revenue had to be ascertained, which is an extremely difficult process. The Opinions now provide alternative means of meeting requirements, such as establishing that the viewers number at least 50,000 or that there are 'more than 500 pieces' of copyrighted work being distributed. Perhaps most interestingly, Article 15 potentially provides for the pursuit of contributory infringement claims by identifying the facilitation of copyright infringement as permissible for criminal prosecution. It identifies, as potential accomplices, those that "provide such services as internet access, server co-location, network storage space, and communication and transmission of channels".[17]

In the **United States**, where the majority of UGC Live sites are currently registered and/or hosted, the existing DMCA provides online service providers with a safe harbor from copyright infringement liability in the event that users utilise the platform to distribute unauthorised material. Generally speaking, the DMCA provides a degree of immunity from prosecution for network providers who maintain policies to terminate repeat offenders and accommodate standard measures to protect against infringement (i.e. the removal of content upon receipt of a properly formatted DMCA notification from a rights holder or their representative). Such measures were initially envisioned as operating through the process of notice and takedown for infringements which did not necessarily require immediate action. This creates obvious issues when considering the perishable value of live sporting content. Subsequently, there is increasing pressure in the United States to update the DMCA, with the Combating Infringement and Counterfeits Acts (COICA) currently being tabled. This proposes a new range of powers which would equip the US authorities with a new set of tools for combating online copyright violations. Proposals include the ability to ensure ISPs block domestic user access to sites based offshore, as well as compel advertisers and payment processors to cease associations with known infringers.

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[17] For a useful review of the Opinions, see http://www.chinalawinsight.com/2011/01/articles/intellectual-property/new-guidelines-for-criminal-prosecutions-of-online-copyright-infringement-provide-aid-in-fight-against-online-piracy/

Due to the variations in domestic copyright protection, many feel that greater international cooperation is the best hope for securing weak links in the global system. However, at present the enactment of an encompassing multilateral agreement appears a distant prospect.

3.4   Litigation

Despite the extent of online piracy, legal action against sites and those facilitating the piracy of their content often remains a last recourse for rights holders. Due to the complex jurisdictional issues that can accompany challenges to online piracy, domestic copyright litigation is a remedial tool available only in limited circumstances. Even when viable, the process is necessarily reactive and is generally expensive and time consuming.

Legal responses tend to focus on the contributory infringements of those who facilitate illegal piracy, and there have been a number of landmark cases which have sought to establish precedents based on the principle.

In March 2011, the owner of the distributor site Channelsurfing.net was charged with one count of criminal infringement of copyright by the US Attorney for the Southern District of New York. The arrest and subsequent prosecution of the individual follow a Seizure Affidavit, issued in February 2011 to the New York office of Homeland Security Investigations, through which the 'Channelsurfing.net' domain name was seized. Since the registration of the domain in December 2005, the site had been used to provide links to unauthorised streams of a wide variety of sports, including content from the AELTC, Bundesliga, ECB, PGA European Tour, Formula 1, Premier League, RBS 6 Nations, Roland Garros, the R&A, Ryder Cup, Tennis Australia, UEFA Champions League, UEFA Europa League, UFC and WTA. It has been estimated that advertising revenues accruing to the site since it's inception grossed around $90,000.

The Channelsurfing case is the latest in a series of prosecutions that seek to In 2005, in a case brought by Metro-Goldwin Mayer Studios against the P2P-based file-sharing service Gokster, the US Supreme Court found evidence that the site
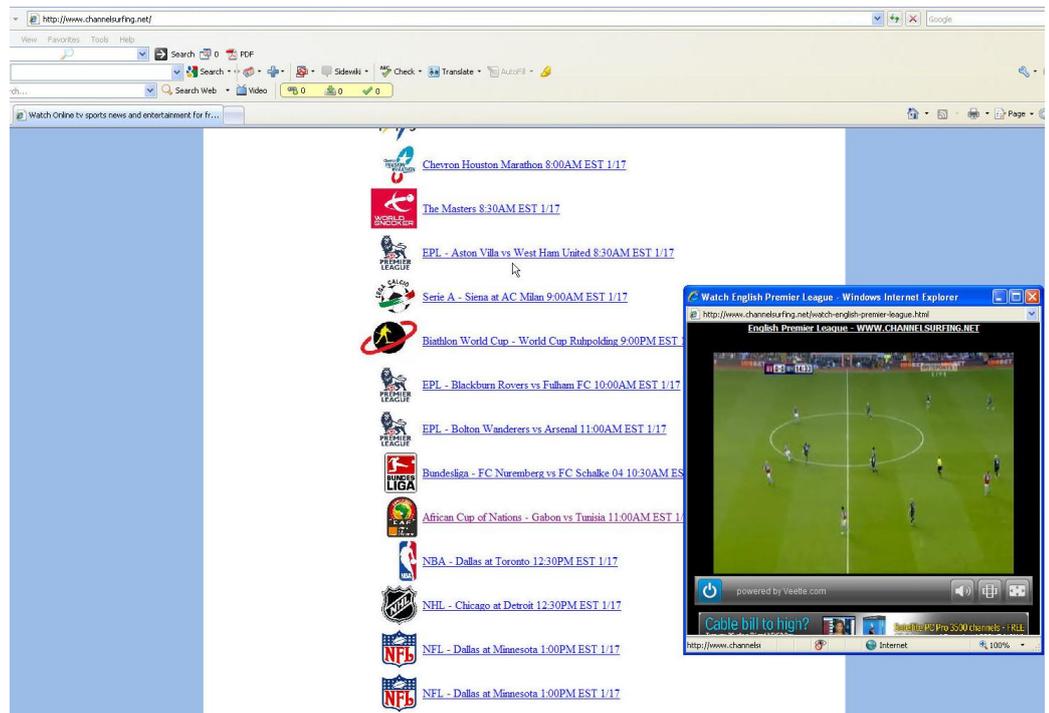
was inducing customers to use their technology for the purposes of copyright infringement as they has not "attempted to develop filtering tools or other mechanisms to diminish the infringing activity using their software"[18]. In December 2009, the judgment in a further case was also premised on the theory of inducement. In this instance, the District Court of California found the popular BitTorrent index, isoHunt, liable liable for infringing the copyrights held by the members of the Motion Picture Association of America (MPAA). The site itself was effectively a search engine rather than the host of the content located through its use.

3.5   Looking Forward: Opportunities and Obstacles

In an environment defined by constantly changing patterns of use and technological innovation, speculation about the future is always likely to be tricky. It is likely that workable, concrete solutions will involve the use of a package of tools, and will require the involvement of all stakeholders.

As a result of the cross-jurisdictional nature of online activity, the old aphorism that a chain is only as strong as its weakest link seems a particularly fitting metaphor with which to encompass one of the major issues in tackling online piracy. Put simply, so long as there are countries and territories whose legislation (or failure to enforce legislation) allows for copyright infringement, there will always be those who seek to take advantage of such safe havens for the purposes of online piracy. It is imperative therefore that copyright legislation is reviewed and/or refined in various contexts if this situation is to be resolved. This should involve the enactment of new powers that underscore the specific needs of tackling live piracy, as well as provide much needed clarification in matters such as the nature of contributory infringements.

Site owners and ISPs based in the USA continue to evoke the DMCAs safe harbor provisions, claiming that their willing compliance with notifications adequately protects them from liability. Thus far, legislators in the US and elsewhere have proved reluctant to impose substantial liability on network providers, or require them to filter content. Whilst some feel that this is due to the belief amongst lawmakers that thorough application of DMCA should be sufficient, others argue that it owes much to concerns that the cost of doing do so would deter the deployment of network services[19]. Whilst rulings such as those mentioned previously in the *Grokster* case offer glimpses of potential positive changes, the fact remains that such judgements have not been followed by corresponding changes to existing legislation. The possibility does, however, remain that courts may begin to mandate filtering for piracy once they accept that the software is now viable[20].

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[18] *Metro-Goldwin Mayer Studios Inc. vs Grokster Ltd.*, 545 U.S. 913. 939 (2005).
[19] Such views were expressed by Mr. Christopher S.Yoo, Professor of Law and Communication, Universtiy of Pennsylvania Las School, during the hearing before the Committee on the Judiciary House of Representatives on 'Piracy of Live Sports Broadcasting Over the Internet'. December 16, 2009.
[20] For example, in 2007 a Belgian court issued an injunction on an ISP to adopt filtering software. The injunction was listed in 2008 however on the basis that the technology was not yet fit for purpose.

Under the provisions of the DMCA, an individual may file a counter-notice following any claims of IP rights violations. The rights holder then has a period of 10 days in which to bring a lawsuit or resolve the claim directly with the pursuant, following which the service provider is then required to restore the contended data to it's original location. A counter-notice must contain the individuals personal details, location of the material in question, statement that the material was removed under incorrect circumstances, and consent to local federal court jurisdiction (or appropriate body if individual is domicile overseas). Though one positive by-product of the provision is the possibility that individuals making claims on false grounds may unwittingly disclose their personal details. the continued use of counter-claims often acts to slow efforts aimed at combating piracy, as well as increasing expenditure.

To some, the need for prompt removal is a pressing issue that takedown tools alone may not adequately address. The process does, after all, still require that the rights holder or a representative locate the material in the first instance. In 2009, a United States Congress House Committee convened a hearing on live online sports piracy. As was stressed by UFC CEO Lorenzo J. Fertitta before the Committee, a single UFC fight may last just a matter of seconds, by which time the damage done by any delays in takedown is already done. Many believe that the solution lies in the adoption of digital fingerprinting technologies by such sites. Indeed, the technology is already being used by some major UGC sites in conjunction with major US-based sports rights holders. This of course begs the question of why other sites are not adopting the technology when it appears to be within their power to do so. It has been argued by the owners of such sites that their very willingness to engage with rights holders in the creation of takedown tools already goes above and beyond current requirements under law, and they are thus under no obligation to concede further ground. Current legislation was largely envisioned as operable almost solely through the notice and takedown method. Scant attention was given to the importance of the immediacy of action.

Under the current situation, the lack of responsibility afforded to ISPs (and site owners) necessarily entails repeat costs for rights holders, who must deal repeatedly with the same sites (and often the same individuals).

At present, domestic requirements for the personal details given upon domain registration vary, but it is fair to say that existing provisions in most countries favour those wishing to abuse the system. It is important to note that matters are once more complicated by the fact that individuals may chose to register a domain through an organisation in a country in which they are not domicile. Even when stipulations do exist requiring that registrants provide accurate details, these generally appear far too easy to circumvent. In the United Kingdom for example, any individual who wishes to register for a 'non-trading' website has an opt-out when it comes to providing an address. Indeed, even when a name and address are provided, there is no legal requirement that a domain registration company confirm these to be correct. In the United States, it is possible to register a website by proxy, meaning that no personal details are available for the site owner without subpoena. Similar provisions exist in

many countries, and it is not uncommon to find ludicrously false details listed through regular site owner lookups[21]. At the opposite end of the spectrum, in Korea it is possible only for nationals to register a Korean domain, with details such as a proof of residency required as part of the registration process.

The issue of site blocking is one that offers mixed portents for rights holders in the future. Proposals such as the DEA in the UK and COICA in the US envisage the use of site blocking to bar domestic users from accessing offshore sites that are engaged in piracy. However, the rise in popularity of streaming on UGC Live sites threatens to limit the effectiveness of such an approach. Since such sites are generally premised on legitimate use, serious questions are raised as to the viability of a blanket ban. It is highly doubtful that current proposals would, for example, be able to ensure that users in the UK were not able to access a broad variety of the UGC Live streams that currently constitute a significant proportion of the unauthorised live broadcasts available today.

Ultimately the relative popularity of UGC Live streaming compared to P2P presents rights holders with both obstacles and opportunities. That UGC Live sites tend to predominantly host user generated or legitimate content and are hosted in countries with existing online IP legislation offers much cause for optimism in the near future. At present, the spread of takedown tools provides a means of tackling live content more expeditiously when compared to traditional notice and takedown procedures. Furthermore, the potential for the adoption of fingerprinting-based filtering offers rights holders the possibility that they may dramatically reduce costs whilst ensuring a relatively reliable and expedient means of preventing live piracy. Pressure on UGC Live streaming may ultimately have the effect of moving users back to traditional P2P usage (or indeed to new P2P variants such as StreamTorrent), where there is an increasing trend towards making streams unsearchable or open only to private groups. Whilst such a move would make it far harder for rights owners and those acting on their behalf to locate infringements, it would effectively restrict the exposure and accessibility of streaming. What's more, a return to P2P usage would also enable more effective use of some measures currently under proposal, such as IP gathering under the Digital Economy Act in the UK.

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[21] For example, the details provided for one Australian based site were: Donald Bradman, 1 Australia Street, Sydney.

Case Study: Football

❖ *Participating Organisations:* Deutsche Fussball Liga (Bundesliga); Deutscher Fußball-Bund e.V.; Fédération Internationale de Football Association; Football Association (England); Ligue de Football Professionnel; Premier League; Scottish Premier League, Union of European Football Associations.

3.6   Introduction

Football (also known variously as 'soccer' or 'association football') is widely acclaimed to be the most popular sport in the world. In both its international and club formats, football commands a sizeable and dedicated following, reflected in impressive attendance and live broadcast figures. Official figures for the 2006 FIFA World Cup Germany™, arguably the sport's most popular event, indicate that the tournament was broadcast in 214 countries across 376 channels, reaching a net audience of over 26 billion people[22]. In accordance with its global following; football suffers from a considerable degree of online piracy.

		FIFA	Bundesliga	DFB National	DFB Pokal	Premier League	SPL	UEFA Champions League	UEFA Europa League	Average
Monitoring Period		2010 World Cup	2010/11 to MD21	2 matches	3 matches	2010/11 to 06/02/11	2010/11 to 06/02/11	2010/11 PO1 to MD6	2010/11 MD1 to MD6	n/a
Total Sites & Developers	**Streaming**	26	33	16	15	50	32	31	36	29.9
	Distributing	258	221	46	49	450	77	264	212	197.1
UGC Live	**Streams**	16,426	2,347	129	96	11,444	660	3,710	2,317	4641.1
	Sites	17	24	12	14	36	23	22	26	21.8
	Distributors	179	156	28	29	376	51	199	159	147.1
P2P	**Streams**	1,503	208	7	3	1,457	-	388	251	545.3
	Unique URLs	230	58	4	1	283	11	147	100	104.3
	Developers	9	9	4	1	10	9	9	10	7.6
	Distributors	79	65	18	20	74	26	65	53	50.0
Streaming Sites		0	0	0	0	4	1	0	0	0.6

3.7   Overall Trend

Evidence gathered on live piracy contained a variety of international and club format football competitions. Specifically, monitoring was undertaken on: the 2010 FIFA World Cup South Africa™; three domestic leagues, the German Bundesliga, English Premier League and the Scottish Premier League; two multi-league cup competitions, the UEFA Champions League and UEFA Europa League; the German Pokal Cup (DFB); and Euro2012 Qualifiers involving the German national team (DFB). Samples were also taken from the French LFP and English Football Association Cup.

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[22] http://www.fifa.com/aboutfifa/marketing/factsfigures/numbers.html - as yet no figures have been released for FIFA World Cup 2010.

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Intellectual Property Protection

The results display a clear trend towards the predominance of UGC Live streams as a proportion of all streaming infringements located. UGC Live streams accounted for 90.5% of all individual streams found (that is to say, of each individual stream accessible to the end user, irrespective of origin or repeat use). P2P infringements accounted for 9.5%, whilst subscription-based unicast streaming made up just 0.01%[23]. On average, nearly 22 different UGC Live sites offered unauthorised football broadcasts during the monitoring period, whilst a further 147 sites distributed UGC Live content. A mean of 5.2 P2P streaming infringements per unique URL was also discovered, suggesting that repeat use remains an issue.

3.8   Example – Fédération Internationale de Football Association (FIFA)

Monitoring for FIFA comprised the entirety of the 2010 FIFA World Cup South Africa™, arguably the single most popular event in the international sporting world. Data gathered during the event accorded with what would be expected from a tournament that boasts appeal beyond the regular football fan alone. A total of 17,929 streaming infringements were located during the event, 16,426 of which were located on just 17 different UGC Live streaming sites. The relative ease of access to UGC Live type streaming compared

to P2P facilitates their use beyond the regular streaming demographic, especially during a tournament in which many might seek streams during standard working day hours.

Though 17 different UGC Live sites were found to offer unauthorised content, the five sites with the greatest number of infringements together accounted for 15,235 (92.7%) of these. The most popular of these sites were

responsible for 13,030 infringements, or 79.3% of the total. At the time of the event, just 4 of the 17 sites offered automated takedown tools. However, whilst the proportion of sites offering such tools was low at the time, those that did accounted for a total of 12,638 streams, 76.9% of the total.

In terms of P2P streaming, 1,530 infringements were located on 230 unique URLs across 9 different P2P developers. Of the 258 sites found to be distributing unauthorised streams, 179 offered primarily UGC Live content, whilst 79 relied on P2P technology. These figures are consistent with the overall trend towards UGC Live streaming in terms of the popularity and volume of individual streaming infringements.

3.9   Example – Bundesliga

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[23] Figures exclude SPL data as exhaustive statistics on individual P2P streaming infringements were unavailable.

Over the course of the 2007-8 Bundesliga season which formed the data sample for the previous report, a total of 85 sites, servers, distributors and developers were located that provided unauthorised live streams. Based on the current monitoring period from the 2010-11 season, from matchdays 1 to 21, this figure has risen to 254. It is particularly noteworthy that in 2007-8, 96% of infringing sites used P2P technologies to distribute content. Thus far in 2010/11, only 26.8% of infringing sites are P2P-based, with the remaining 73.2% occupied exclusively by UGC Live-based content distribution.

In terms of P2P streaming, a total of 208 streaming infringements were found on 58 unique URLs across 9 different P2P developers. UGC Live streams on the other hand, totalled 2,347, and were spread across 24 different sites such as ZoneIn.tv (pictured right). Statistics up to matchday 17 indicated that the top 5 most popular UGC Live sites had accounted for 60.1% of the UGC Live streams located.

3.10   Example – **Deutscher Fußball-Bund e.V (DFB)**

Monitoring for the DFB up to date has included 2 national team matches (Euro2012 Qualifiers versus Turkey and Azerbaijan) and 3 rounds of the Pokal Cup, the DFB's domestic club competition. The streams located for both formats once again reflected the wider trend towards UGC Live streaming relative to P2P-based content. In terms of individual streaming infringements, the national team fixtures grossed a total of 129 UGC Live infringements as opposed to just 7 P2P. Whilst the UGC Live streams were spread across 12 different sites, the P2P streams were located on just 4 unique URLs on 4 different developers. Streaming for the Pokal Cup illustrated this trend to an even greater extent, with 96 UGC Live infringements spread across 14 sites compared to 3 P2P infringements, all stemming from the same unique URL on one developer.

3.11   Example – Premier League

England's Premier League attracts a sizeable global following, and is currently broadcast in 211 countries worldwide. Content is made available on a platform neutral basis. In-line with many other premium sports events, live Premier League content is often broadcast via subscription-based television channels. Accordingly, online streaming is often the choice of individuals seeking to circumvent subscription charges.

The monitoring period for the Premier League was from the start of the 2010/11 season up to and including fixtures played on 06/02/11. During this period, a total of 12,905 individual streaming infringements were located. Of these, 11,444 were UGC Live streams, spread across 36 different sites. Individual P2P infringements accounted for 1,457 of these streams, and were located on 283 unique URLs across 10 different P2P developers. Just 4 paid unicast streaming sites offered Premier League content.

In comparison to the 2007/8 season that provided the data for the 2008 Report, monitoring of the 2010/11 season thus far reveals a significant increase in both the absolute and relative popularity of free, non-P2P streaming:

Season	P2P Based	Unicast & UGC Live Based	Paid	Free
2007/8	63%	37%*	27%	73%
2010/11 to 06/02/11	12.4%	87.6%*	0.6%	99.4%

*In 2007/8 UGC Live type streaming was in its infancy. The term 'Unicast' then referred to any streaming that used non-P2P methods.

Infringement Type	2007/8 Season	2010/11 Season to 06/02/11
P2P Developers	7	10
P2P Distributors	90	74
Streaming Distributors	18	376
Streaming Sites	24	4

The Premier League has become particularly popular amongst streamers on UGC Live sites, with a total of 36 different sites having offered their content during the monitoring period – more than has been observed for any other participant in this report. Moreover, the numbers of distributors who rely primarily on UGC Live streaming are substantially greater, in both relative and absolute terms, than for any other event with a major piracy issue under discussion in this report.

Whilst the absolute number of P2P developers distributing Premier League content has increased, their relative popularity has declined significantly. The P2P figures for the Premier League thus far this season bear close comparison to those located during the 2010 FIFA World Cup South Africa™, especially in terms of the number of unique URLs and developers responsible for all infringements. Such a phenomenon may add weight to the notion that P2P usage remains most popular amongst more experienced users whilst UGC Live is more attractive to the newer streamer, who might place more emphasis on immediacy and ease of use.

3.12 Example – Scottish Premier League (SPL)

Monitoring for the Scottish Premier League is based on the current 2010/11 season, up to and including fixtures played on 16/02/11. It is perhaps fair to say that the Scottish Premier League is dominated by two of its constituent teams in particular, Celtic FC and Rangers FC, and the vast majority of streaming located is focused on their fixtures (particularly the 'Old Firm' derbies in which the two play each other). Once again UGC Live streams have formed the majority of those located, with 660 infringements found on 23 different sites.

3.13   Example – Union of European Football Associations (UEFA)

The UEFA Champions League (UCL) and the UEFA Europa League (UEL) are two of the most prestigious competitions on the world's football calendar, and indeed within global sports entertainment as a whole. The final of the Champions League in particular – a multi-format club competition involving Europe's top sides – is now believed by some to be the single most viewed annual sports event. A report by the Initiative Futures Sports and Entertainment indicated that the 2010 Champions League final between FC Barcelona and Manchester United drew a global audience of around 109 million, greater than that of the NFL Super Bowl. The status of the clubs involved and the high profile of the event, guarantees a dedicated worldwide following, and accordingly the event is widely streamed. In many leading markets, broadcast rights are split between free-to-air and subscription based services, and therefore unauthorised online content is often sought by those seeking to circumvent fees.

Monitoring for the UEFA Champions League has entailed the current 2010/11 competition, from the first Play-Off (qualification fixture) up to and including fixtures on matchday 6 (final matches of the group stages). For the UEFA Europa League, monitoring has constituted matchdays 1-6 of the current 2010/11 event. Thus far, UGC Live streaming has formed the greater part of individual infringements found, with 3,710 infringements on 22 sites for the Champions League, and 2,317 across 26 sites for the Europa League. P2P streaming for the UCL accounted for 388 individual infringements on 147 unique URLs across 9 developers, whilst for the UEL 251 infringements were found on 100 unique URLs on 10 different developers.

3.14 Other Leagues and Tournaments

Samples taken during the current 2010/11 French Ligue de Football Professionnel (LFP) season and 2010/11 English FA Cup competition confirm the wider trend towards UGC Live streaming over standard P2P methods. A sample of links taken from one of the most popular streaming link distributors during LFP fixtures on 05/02/11 revealed 100% of unauthorised content to be UGC Live in nature. Links to Bet365.com, who offer official streams to registered users, were also listed.

A sample of streaming during the Football Association's FA Cup 5th Round tie between Leyton Orient and Arsenal on 20/02/11 found that 67.2% of infringements located were UGC Live as opposed to 32.8% on P2P. Around a quarter of UGC Live links on distributor sites were for Veetle streams (see image to the right), whilst SopCast was the most popular P2P (60% of links).

4 Case Study: Cricket

❖ *Participating Organisations:* Cricket Australia; England and Wales Cricket Board (ECB); International Cricket Council (ICC).

4.1 Introduction

Cricket has a large and passionate fan base that spans the globe. Over the last two decades, the sport has seen a significant growth in the number of international matches played within a variety of new formats. Alongside the traditional format of test cricket, tournaments such as the ICC Twenty20 World Cup and the Indian Premier League have expanded cricket's following to different demographics and produced an ever-larger audience. The ICC Cricket World Cup is widely seen to be the third most viewed sports event in the world behind only the FIFA World Cup and the Summer Olympics. The data and other content for this section have been provided by Copyright Integrity International.

4.2 General Trend

For several years, cricket has been an important target for unauthorised live stream piracy. This is particularly the case in countries such as India, Pakistan and Sri Lanka where the sport is most popular (there is a noticeable spike in piracy levels for fixtures involving India, Pakistan and Sri Lanka). In the 17 series and tournaments covered between January 1 2010 and December 31 2010, a total of 11,233 unique live source video streams were identified, as illustrated below.

Period of Coverage	Series/Tournament	Governing Body	Number of Unauthorised Digital Live Streams
Jan 2010	South Africa v England 2009/2010	Cricket South Africa	124
Jan 2010 – Feb 2010	Australia v Pakistan 2009/2010	Indian Premier League	328
Jan 2010	KFC Twenty20 Big Bash 2009/2010	Cricket Australia	9
Feb 2010	Australia v West Indies 2009/2010	Cricket Australia	182
Feb 2010	India v South Africa 2010	Board of Control for Cricket in India	852
Mar 2010 – Apr 2010	Indian Premier League 3	BCCI-Indian Premier League	3,308
Apr 2010 – May 2010	World Twenty20	International Cricket Council	1,662
May 2010 – Sep 2010	England v Bangladesh 2010 England v Australia 2010 England v Pakistan 2010	England and Wales Cricket Board	1,558
Sep 2010	Champions League Twenty20 3	BCCI-Champions League T20	851
Oct 2010	India v Australia 2010	Board of Control for Cricket in India	434
Oct 2010 – Nov 2010	Australia v Sri Lanka 2010	Cricket Australia	32
Oct 2010	South Africa v Zimbabwe	Cricket South Africa	51
Nov 2010 – Dec 2010	India v New Zealand	Board of Control for Cricket in India	650
Nov 2010 – Dec 2010	The 2010/2011 Ashes	Cricket Australia	846
Dec 2010	India v South Africa 2010/2011	Board of Control for Cricket in India	346
Total			**11,233**

Source: Copyright Integrity International

In common with the other sports covered in this report, the last three years have witnessed three important trends in the digital piracy of cricket content: (1) a movement towards more advertising-based piracy models as opposed to pay-for-view models; (2) rapid growth in UGC Live piracy; and (3) continued growth in the embedding of streams throughout the Internet. Each of these developments has had the effect of increasing free access to unauthorised streams of live cricket action online.

The trends in cricket streaming show clear conformity to those observed for other sports over the last few years. In 2005, the majority of unauthorised cricket streams utilised unicast technology and often required subscriptions. Since then, the sport has witnessed the familiar pattern of rising P2P use followed by the emergence and rapid ascendancy of UGC Live streaming. Whilst pay-per-view streaming accounted for 21% of unauthorised cricket streams in November 2007, this figure has dropped to less than 3% in January 2011.

2007   **2010**
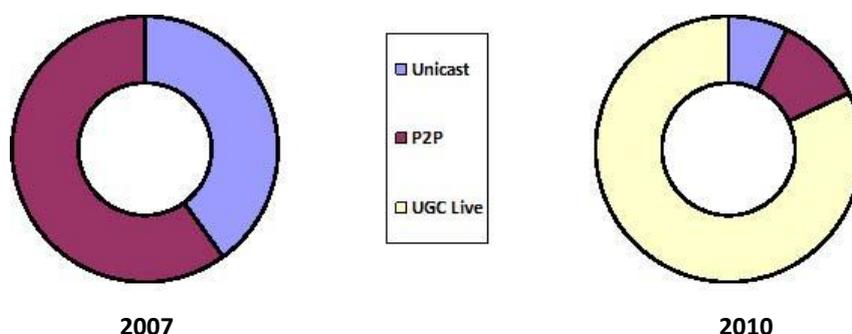
Source: Copyright Integrity International

Compliance to the principles set forth in the DMCA legislation varies considerably across UGC Live platforms. Several provide a facility for authorised agents to directly take down streams, however many new players fail to offer this essential service to rights holders.

Cricket has also witnessed continued growth in the number of embedded streams and links to streams found on free hosting services. These embedded streams and links are often found on free blogging sites, such as Blogspot (which is now owned by Google). Such blogs and web page creation portals are popular as it takes only a matter of minutes to establish the site and post content of any kind to the page. Moreover, there is no cost or financial penalty associated with the blogging sites even if a page or site is removed.

Relevant subdomains, including *ipl-on-sopcast.blogspot.com*, are also freely available to help promote new site and pages. Typically, users will post comments which update other users as to working streams in real-time as a match or tournament progresses. It should also be noted that P2P services have developed clients which can be embedded into web pages, thus meaning that streams can be placed directly in each blog.

Further, online forums, Google AdSense and targeted online campaigns provide the potential for

organisations to advertise directly to the sports-viewing public without the need for sponsorship of events. This can be considered a form of ambush marketing – or low involvement association.

4.3   Example – ICC World T20

During the ICC World T20 tournament in 2010, 1,662 live source streams were identified over the course of the series. This figure is striking given the relative brevity of the tournament (slightly over two weeks in duration). Important areas where pirate streams were viewed include the United States, India, Pakistan, Canada and the Middle East. Each of these jurisdictions represents large and growing cricket markets.

4.4   Example – Indian Premier League (IPL) 3

Over the course of IPL 3 in 2010, pirate activity was substantial in spite of the ready availability of YouTube's legitimate live video feed in most countries (this stream was slightly delayed). This reflects the strong international interest in the competition, the financial incentives that persist for pirates and the growing threat posed by internet broadcasting. In total, 3,308 live source streams were identified during the series. Pirate activity persisted throughout the IPL 3, however the quantity of live streaming sources declined slightly as the tournament progressed. The largest source of infringements originated from UGC Live streaming service providers Freedocast, Vshare, UStream and Justin.tv.
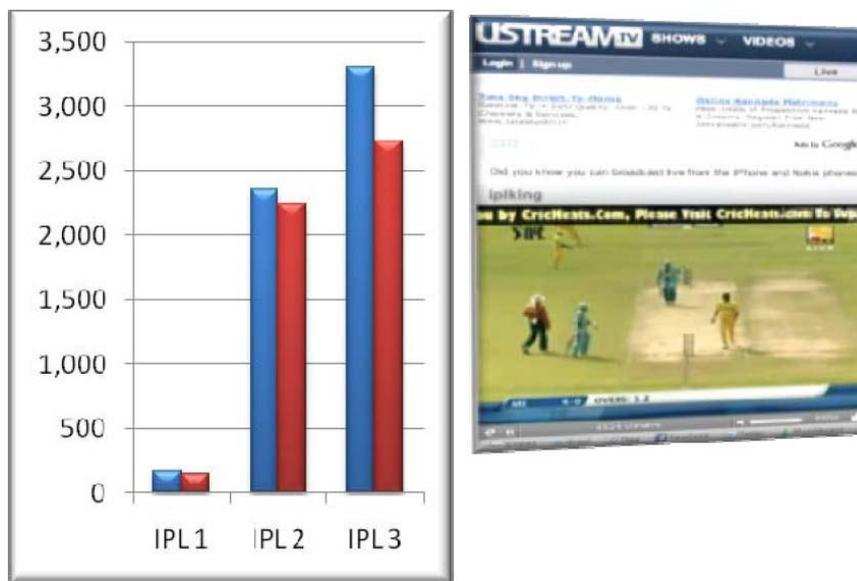
	IPL 1	IPL 2	IPL 3
Streams identified	169	2,356	3,308
Average streams per match	2.9	39.9	55.1

Source: Copyright Integrity International

4.5   Jurisdictional Arbitrage

Some of the large difficulties in combating piracy by professionally-organised pirate websites are well illustrated by efforts taken on behalf of a range of major clients including the International Cricket Council, the Board of Control for Cricket in India and Cricket Australia. For example, www.crictime.com has resolutely ignored cease and desist notices and related legal notices. The operators of the site have been quick to move from provider to provider as the payment, advertising and hosting infrastructure on which the site relies has been systematically frozen and closed. In total, the website has changed web hosting providers over 16 times and has utilised the services of numerous online advertisement publishers over the last two years. Such issues of jurisdictional arbitrage underline the importance of a holistic, global response to digital piracy.

4.6   Legal action

Several key stakeholders in cricket, such as the International Cricket Council and broadcasters such as Willow TV have pursued legal action to address major infringers. Actions undertaken include:

- freezing the accounts of infringing websites across a range of payment providers, advertising providers and Internet hosting services;
- the use of subpoenas, court orders and other instruments to obtain detailed information about the identities of both the account holders (i.e. the owners of the websites) as well as the identities of users and using this identity information to work with authorities in the respective jurisdictions; and
- facilitating the recovery of royalties from infringers.

4.7   Conclusion

It is clear that online piracy continues to be a major problem in cricket. In spite of some success in negotiating direct take down capability with some major UGC Live sites and modest gains using legal channels, pirate websites continue to be highly agile, resilient and adaptable. The huge spike in unauthorised streams reflects this; as streams are taken down they are put up elsewhere on the Internet. Ultimately, like many other sports, funding models in cricket are hugely dependent on broadcast rights deals and sponsorship deals. Both of these sources of income are crucial to the future sustainability of cricket from the grass-roots level right up to professional cricket. Should digital piracy continue to grow, it poses a direct and real threat to both these funding sources. This places an enormous challenge on rights holders in cricket.

5   Case Study: Tennis

❖ *Participating Organisations:* All England Lawn Tennis and Croquet Club (AELTC); Fédération Française de Tennis (FFT); International Tennis Federation (ITF); Lawn Tennis Association (LTA); Tennis Australia; Women's Tennis Association (WTA).

5.1   Introduction

Tennis enjoys a global following, with an equally extensive distribution of telecast rights to match. Though a long-established international sport, the popularity of tennis has continued to grow in recent years, most notably in China from which a generation of promising female players has emerged. The professional sport operates at a variety of levels, and is primarily organised along an annual series of tournaments in which players compete as individuals or in doubles. Amongst these events, the so called 'Grand Slam' tournaments (or Majors) are the Australian Open, French Open, Wimbledon and the US Open. The remaining events form the men's ATP Tour, and the Women's Tennis Association (WTA) Tour. Though primarily an individual/partnership sport, the game is also contested in an international format through the Davis Cup (men) and Fed Cup (women) in which players represent their nations as teams.

5.2   Overall Trend

In the 2008 SROC report, it was noted that a total of 129 sites were located either streaming or distributing unauthorised tennis content for a total of seven events (2006, 2007 & 2008 Australian Open; 2006 & 2007 Wimbledon Championships; and 2007 Australian Open); 59 of these related to the 2008 Australian Open, whilst a total of 95 were P2P based. In comparison, the data from the 2010 French Open and 2011 Australian Open alone show a total of 187 sites and distributors.

		FFT	Tennis Australia	WTA	Average
Monitoring Period		2010 French Open	2011 Australian Open	15 Events	n/a
Total Sites & Developers	**Streaming**	14	28	18	20.0
	Distributing	67	78	14	53.0
UGC Live	**Streams**	786	1,958	657	1,133.7
	Sites	8	23	13	14.7
	Distributors	34	31	14	26.3
P2P	**Streams**	102	115	-	108.5
	Unique URLs	24	21	12	19
	Developers	7	5	5	5.7
	Distributors	31	47	0	26
Streaming Sites		1	1	0	0.7

As noted for other sports, the major trend has been the increase in popularity of UGC Live streaming, though it is possible that this has been a much more recent phenomenon in the realm of tennis as compared to other sports. Despite the relatively short time frame between the 2010 French Open (May/June 2010) and the 2011 Australian Open (January 2011), there was a significant increase in the number of UGC Live streams and sites located, whilst figures for P2P streaming remained fairly constant. Perhaps an explanatory factor here is to be found in the advances in streaming quality available through such sites. These are particularly pertinent when considering tennis as the relatively fast speed and small size of the ball itself makes lower quality (e.g. lower frame rate) streams unappealing to the average user.

5.3   Example: Fédération Française de Tennis (FFT)

The Fédération Française de Tennis, or FFT, governs the organisation and promotion of tennis in France. The FFT are perhaps best known for the prestigious Roland Garros, otherwise referred to as the French Open, one of the four annual competitions that constitute the Grand Slam events. The event is instantly recognisable to viewers as the sole Grand Slam that is contested on a clay surface. The monitoring period for the FFT comprised the entirety of the 2010 French Open Tournament.

Whilst the data from the tournament sits in-line with the general trend of increasing UGC Live dominance, it is also worth noting that official simulcast streams were leaked and subsequently distributed. With regards to UGC Live streaming, the 786 streams located were spread across 7 different sites. Two sites in particular accounted for 59% of individual infringements. A total of 102 individual P2P streaming infringements were located on 24 unique URLs across 7 different developers. One particular developer accounted for 62 infringements (60.8%), which were spread across 15 different URLs (62.5%).

5.4   Example: Tennis Australia

Tennis Australia is the sports governing body within Australia, and is responsible for organising the Australian Open, the first Grand Slam event of the professional season. Monitoring for this report comprised the complete 2011 Australian Open event, notable for featuring the first ever Grand Slam singles finalist from the People's Republic of China (where the sport has a rapidly increasing following) in the women's event.

In common with Roland Garros, a leaked stream from a major content delivery network was also discovered. This was once again distributed on various sites, usually in embedded form. Whilst data from the event conforms to the wider trend in terms of UGC:P2P popularity, it is noteworthy that

there were significantly more P2P distributors than for other modes of streaming (47 compared to 31). This is likely in part due to the presence of China's Li Na in the women's final, as P2P technology remains relatively popular in Asia. UGC Live streaming remained by far the most popular in terms of individual infringements, with 1,958 occurrences across 23 different sites. The increase in UGC-Live popularity relative to the French Open discussed above is illustrative of the rapid rise of UGC Live sites in the past year.

5.5   Other Participants

Though more exhaustive data is available only for the Women's Tennis Association (WTA), tennis is widely streamed through both UGC Live and P2P methods. Data from the 15 WTA events that form the basis of this study indicate that 13 different UGC Live sites and 5 P2P developers have offered WTA content. A total of 657 streams were found on these 13 sites. Whilst data on individual P2P infringements is not available, it is known that content was available on at 12 different P2P URLs (across sports, there are usually roughly 2-5 infringements per unique URL). Whilst no extensive statistics are available for Wimbledon 2010, the sports pre-eminent event, streaming has been observed across through various methods. A brief sample during the 2010 tournament located unauthorised content on all major UGC Live sites, as well as on at least 5 P2P platforms.

6   Other Participants

6.1   Formula One

Formula One, also known as Formula 1 and F1, is the world's premier motorsport competition, enjoying a substantial and dedicated global following. Live telecast rights are sold to 68 national broadcasters and a number of pan-regional broadcasters, which combine to broadcast the sport to 187 countries., In the majority of these, audiences are offered free-to-air broadcasts. Furthermore, online availability of official broadcasts is increasing, with official simulcasts available in a number of countries for the 2010 season, including the United Kingdom, Germany, Spain, Turkey and Brazil.

	2007	2008	2009	2010
UGC Live Infringements	0	127	849	2,367
Other Live Infringements	93	162	164	234

The monitoring period for this report is comprised of the qualifying sessions and main race from all 19 events of the 2010 season. As may be observed in the table above, Formula One is consistent with the wider trend towards UGC Live type streaming, whilst the popularity of P2P and 'traditional' unicast

streaming has increased only marginally. Whilst the 2,367 UGC Live infringements located over the duration of the season were spread across 15 different sites, the distribution was far from even. The most popular single UGC Live sites contained 48.5% (1,147) of all UGC Live infringements found, whilst the next 3 most popular accounted for a further 30.0% of the

total. With regards to P2P streaming, a total of 77 unique infringements were found. These were located on 29 unique URLs on 9 different developers. One developer, UUSee, was found to have distributed unauthorised streams for 18 of the 19 races in the season. It is perhaps interesting to note that, despite the dominance of UGC Live streaming over P2P in terms of individual infringements, the numbers of distributors utilising P2P content (75) were much closer to those relying primarily on UGC Live (108).

6.2   Golf

❖ *Participating Organisations:* PGA European Tour; The Royal & Ancient.

At the time of the previous SROC report, it was commented that golf was not a relatively widely streamed sport, with "rarely more than two or three individual streams from which to choose for most tournaments". Since then the situation has changed, thanks in part due to hardware and software advances that have facilitated better quality streaming; the smaller size of the golf ball itself has acted as an obstacle of sorts to unauthorised streaming in the past, being harder to distinguish on lower quality streams – this is no longer the case in 2011. In part as a result of technological improvements, monitoring for the 2010 Ryder Cup (PGA European Tour) and 2010 Open Championship (The Royal & Ancient), revealed a far greater level of piracy than was previously the case.

Monitoring for the 2010 Ryder Cup revealed a total of 98 individual streaming infringements. Of these, 78 were UGC Live infringements over 10 different sites, whilst 20 were P2P streams located on

8 unique URLs on 6 different developers. In terms of distributors, 28 sites were found to be offering UGC Live content, whilst 43 offered P2P streams. Just one traditional subscription-based streaming site was located. One site was observed embedding a hacked official stream that was not geo-blocked in the first few days of the tournament.

Infringements for the 2010 Open Championships ('The British Open') showed a similar pattern to those observed during the Ryder Cup, with a trend towards UGC Live streaming in terms of individual infringements, but a tendency towards P2P technologies by those distributing. This may reflect the popularity of the sport in Asia where P2P remains popular. A total of 53 UGC Live streams were found on 7 different sites as opposed to 26 individual P2P infringements on 8 unique URLs across 6 developers. Amongst distributors, 23 were P2P-based whilst 18 used other methods. The data indicates that golf is particularly popular amongst P2P distributors, especially relative to the popularity of P2P streams compared to UGC Live. Between the 2010 Ryder Cup and 2010 Open Championships, an average of 23 distributor sites relied primarily on UGC Live content compared to 33 utilising P2P. This may in part reflect the popularity of the sport in Asia where P2P has traditionally represented the streaming orthodoxy.

6.3   Rugby

❖ *Participating Organisations:* RBS 6 Nations; Australian Rugby Union; International Rugby Board (IRB); National Rugby League (NRL); Rugby Football League (RFL); Rugby Football Union (RFU); Aviva Premiership Rugby.

Rugby, in its Union and League formats, has continued to attract new audiences in recent years in both existing markets and new. However, despite a sizeable international following, Rugby has never suffered from the same levels of piracy as other sports of a comparable popularity. That said, the rise

of UGC Live sites is likely to have a significant impact on the unauthorised distribution of rugby broadcasts, as the technology is more widely utilised outside of Asia from where the majority of P2P technology emerged and in which rugby has traditionally attracted a limited following.

Though the monitoring period for the 2011 RBS Six Nations tournament has so far comprised just matches 1-3 from the first weekend of the competition, a greater number of infringements has been observed than was the case for the 2008 report. A total of 57 individual streaming infringements were

located for these fixtures, all but one of which were UGC Live. These 56 streams were located on 12 different sites. Accordingly, no P2P distributors were found whereas 23 sites were found distributing UGC Live content. It is most likely the case that the sport's limited following in Asia is a major factor in the lack of P2P streaming that has accompanied the tournament thus far.

6.4   Ultimate Fighting Championship (UFC)

The Ultimate Fighting Championship, or UFC, is the fastest-growing sport in the world and promotes over 30 live events a year. In addition, the UFC produces over 12 Pay-Per-View events annually and has quickly become an international success, holding events in major cities across the world. UFC programming is broadcast in over 135 countries and territories, reaching 597 million homes worldwide, in 21 different languages.

Investigations into the extent of live streaming for the UFC were undertaken during the 'UFC 126' event held on 5 February 2011. One preliminary fight for this event was also offered by UFC as an official stream through Facebook. Monitoring of 4 UGC Live sites by NetResult found that 21 UGC Live streams were offered for the event on these sites (13 of which were located on Mips.tv). No evidence of P2P streaming was found during this sample. The UFC also utlised Bay TSP who found an additional 107 UGC Live streams spread across ten different websites.

6.5   Australian Football League (AFL)

Australian rules football, though hugely popular domestically, remains only moderately supported throughout the rest of the world. This is an area that has been targeted for growth by the AFL and an area where investment will be significantly increased. With a significant number of Australian expatriates living and working abroad, the growing demand for the international television and new media rights coverage of the game, combined with the limited availability of live AFL broadcasts outside of Australia itself, creates a significant theoretical market for unauthorised streaming. Though no extensive monitoring data is available as to the exact extent of the threat from online piracy, live AFL streaming has been witnessed on UGC Live sites (for example on Justin.tv, Ustream.tv and Veetle.com) and their distributors, as well as on one of the few remaining substantial subscription-based outfits, StreamPro.tv, and a further Australian sports streaming site (OzSport.tv). As yet, no details are available on the occurrence of P2P streaming for AFL events.

7   Appendices

7.1   Appendix: Terminology

Due to the pace of change with regards to the technologies and issues surrounding online content distribution, the terminology used in this report differs in many significant regards from that found in the 2008 Report. It is also worth noting that complex realities and the pace of change can lead to the commonplace use of a term that is not necessarily in-line with its strict technical definition. The use of the term UGC (User Generated Content) in reference to sites such as Justin.tv that also host large volumes of copyrighted material is one such case in point.

Archive – Refers to non-live AV content, such as highlights compilations. Usually associated with UGC-type sites.

CDN – Content Delivery Network. Networks in which data is placed strategically to maximise bandwidth for access to content through the network. For the purposes of this report, CDNs are essentially a more efficient form of streaming server that facilitate better quality content distribution to a greater number of end users than would be the case with a traditional streaming server at a similar cost. CDN use is a major factor in the spread o f UGC Live streaming.

Distributor – Sites that provide links to streams or embed them from other sources. A demarcation is made between those dealing solely in P2P content (P2P Distributors) and those that offer UGC Live streams (Streaming Distributors). In practise the latter will often contain a small number of P2P links, but are now predominantly concerned with UGC Live.

Geo-Blocking – Technology used to prevent access to certain websites or content from users in particular countries or regions. Generally used to conform to restrictions placed on online simulcasts. The technology works through identifying the location of users through their IP address.

IP Address – Internet Protocol Address. Numerical label assigned to an internet user or network providing details of their location.

ISP – Internet Service Provider. Companies that provide internet access and/or hosting services.

P2P – Peer-to-Peer. Technology used to distribute content through a decentralised network of peers. Each connected user (peer) offers part of their own bandwidth to other network participants to distribute information without the need for a core server. A central 'tracker' sorts streams on offer but plays no part in distribution. Some (such as SopCast and TVU) allow users to 'inject' their own content.

P2P Developer – Developers, and often distributors, of P2P software.

Stream – Live distribution of content.

Streaming Server – The server that acts as the source for a unicast stream.

Streaming Site – Website that streams using non-P2P methods. The term is now used to refer to the small number of subscription charging sites that are dedicated to providing streams from streaming servers. These are differentiated from UGC Live sites which are not intended primarily for the streaming of copyrighted content (or at least do not purport to be).

Stream Torrent – New form of P2P technology that operates without the presence of the usual central 'tracker'. This means locating streams is a difficult process.

Takedown Tool – Application on a site or P2P developer, that allows confirmed rights holders or their representatives to remove content directly, without the need for informing the site/developer themselves first. Tools may be used for both live and archived content.

UGC – User Generated Content. Term originally coined to refer to material on sites such as YouTube.com that was supposedly created by the end user. The term is now used to refer to material associated with these same sites, regardless of the nature of content on offer.

UGC Live- Refers to live streaming on sites purporting to provide hosting for user generated video. Most UGC Live sites rely on Content Delivery Networks (CDNs), though some (e.g. Veetle) use P2P technology.

Unicast – Technically, 'unicast' refers to direct streaming from server to user. It is a bandwidth-intensive process that requires one version of the stream to be broadcast to each viewer. In this report, the term 'unicast' will be used primarily to refer to unicast-based subscription sites.