# Money for Nothing

## The Billion-Dollar Pirate Subscription IPTV Business

digitalcitizens alliance | NAGRA KUDELSKI

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# Executive Summary

Consumers have more high-quality entertainment to watch on their television sets, computers, tablets, and phones than ever before. But while consumers can select from an ever-growing variety of legal services, illegal streaming services have emerged in their shadow, leveraging stolen content and off-the-shelf streaming technologies to deliver entertainment at a fraction of the cost of legitimate content providers.

The most virulent and fast-growing illegal streaming enterprise is the pirate subscription Internet Protocol Television (PS IPTV) Service. This type of service mimics the practices of legitimate streaming services. It charges by the month or by the year – typically, about $10 - $15 per month. And for that low price, it provides the customer with thousands of channels of linear television from around the world, and often with tens of thousands of titles for video on demand, including movies still showing in theaters and every episode of entire TV series.

The PS IPTV services industry has grown so rapidly it's a **billion-dollar industry** in the United States alone, organized by individuals with business savvy and supported by a sophisticated supply chain and cutting-edge marketing and distribution techniques.

The basic model for the operators of these services is not complicated. They take stolen content and distribute it via the internet directly to consumers. Since these providers pay nothing to the people who create and own the programming, this is, to quote the rock group Dire Straits, truly "money for nothing."

Much has been written about various kinds of pirate IPTV services and the devices used to access them (variously called "piracy devices," "illicit streaming devices," "Kodi boxes," or "jailbroken devices").[1] [2] And some studies have estimated the losses from illegal streaming to legitimate television distributors or to the U.S. economy as a whole.[3] [4]

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[1] Andrea Peterson. That illegal streaming site you love? It might be infecting you with malware (The Washington Post, December 11, 2015)

[2] Brian Barrett. The Little Black Box That Took Over Piracy (WIRED, October 27, 2017)

[3] Global Internet Phenomena (Sandvine, 2017) (estimating additioal $4.2 billion per year to legitimate distributors if all pirate IPTV services users converted to legal services).

[4] DIGITAL VIDEO PIRACY: Impacts of Digital Piracy on the U.S. Economy (GIPC, June 2019) (global online piracy costs the U.S. economy at least $29.2 billion in lost revenue each year)

There has been less attention paid to the infrastructure of such PS IPTV services, the supply chain they rely upon, the revenues they generate, or their profit margin. Such research is important because it tells us whether these services are mere "spillage," a minor nuisance that should generate modest concern, or a major threat that should draw the immediate and sustained attention of policymakers and law enforcement.

To answer this question, Digital Citizens Alliance turned to NAGRA, the digital TV division of the Kudelski Group and and the world's leading independent provider of content protection and multiscreen television solutions. NAGRA relied on its extensive intelligence gathered over years of examining piracy ecosystems, as well as public data, to estimate the revenue and the profit margins of pirate subscription IPTV Services.

NAGRA's findings are stunning:

- Conservatively, pirate subscription IPTV services generate subscription revenues of **$1 billion annually in the U.S. alone**, even excluding the sale of pirate streaming devices used to receive the content;
- Because the providers of these services pay nothing for the programming that makes up their core product, they operate with estimated profit margins that range from **56 percent (retailers) to 85 percent (wholesalers).**
- An estimated **9 million** fixed broadband subscribers in the U.S. use a pirate subscription IPTV service;
- At least **3,500** storefront websites, social media pages, and stores within online marketplaces sell pirate subscription IPTV services to the U.S. market;
- An ecosystem has emerged around such services, including wholesalers that provide turnkey technology, and retailers that offer the stolen content to the public; and
- The ecosystem also depends upon legitimate players, including hosting services, payment processors, and social media. The extent to which these legitimate players are aware of their role is a subject of debate.

Subscriptions are not the only way illegal IPTV services make money. Ad-financed pirate IPTV, in which the customer accesses the service for free but is presented with advertisements before or

during content viewing is also very popular.[5] Pirates also make money by selling devices that are pre-loaded with apps offering stolen content.

Another way pirates generate revenue is by partnering with hackers to install malware within free apps that expose consumers to risk of theft of their personal and financial data, cryptocurrency mining, adware, ransomware, and botnets using computers to perform distributed denial-of-service attacks. These risks have been documented by Digital Citizens Alliance[6] and warned about by the Federal Trade Commission.[7]

NAGRA also found a scheme where the residential Internet connections of pirate IPTV customers are turned over to others – who could potentially use them for illegal activities, such as accessing child pornography, committing fraud, or participating in cyber attacks.

And in an alarming development, illegal IPTV services enabled Al-Manar, a channel labeled a "Specially Designated Global Terrorist entity," to skirt a U.S. ban. While these issues are not the focus of the report, they are disturbing developments into which Digital Citizens intends to conduct further investigation in the future.

At the heart of these activities – $1 billion in illicit revenue for subscription IPTV, diverted residential Internet connections, and banned content – is a well-organized and profitable industry with low entry costs and high margins, and, as an illegitimate business, one that pays nothing in federal, state, or local taxes.

This report examines the players in the ecosystem and the roles they play, estimates their profits, and highlights the unanticipated consequences of their actions. This report does not suggest that all participants in the ecosystem are knowingly engaged in illicit pirate activity. It does raise the issue of how payment processors, website services, hosting and CDN providers, and other legal businesses interplay with a billion-dollar illegal market. Ultimately, the sheer scope and size of the streaming piracy ecosystem should trigger alarm among policymakers, law enforcement, consumer protection groups, and the technology and financial services industries, and spark a serious discussion about what efforts are needed to diminish this growing problem.

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[5] Megan Graham. Netflix and HBO shows are getting pirated on this app that's been bankrolled by advertisers such as Pandora, BET+ and TikTok (CNBC, October 20, 2019) (article discussing ad-financed VOD app "TeaTV"). Similar ad-financed IPTV services are also available, such as USTVGO and TV Tap for Android.

[6] Fishing in the Piracy Stream: How the Dark Web of Entertainment Is Exposing Consumers to Harm (Digital Citizens Alliance, April 25, 2019)

[7] Alvaro Puig, Malware from Illegal Video Streaming Apps: What to Know (Federal Trade Commission, May 2, 2019)

# The Troubling History of Television Piracy

There is an immutable fact when it comes to entertainment: Whenever content is created and distributed legally, that same content is also redistributed illegally using the same advances in technology created by legitimate businesses. "Pay-TV services" – like those offered by cable, satellite, and more recently legitimate IPTV services - are no different.

In the 1990s, a market for "cloned smart cards" emerged, giving consumers access to satellite and cable pay-TV broadcast feeds without paying for an official TV subscription.

The next decade saw the development of farms of computer servers, loaded with legitimate smart cards, extracting decryption keys for the broadcast feeds. The keys were then distributed, over satellite or the Internet, to custom set-top boxes that decrypted the video, allowing unauthorized access to the content. While this form of piracy still exists, U.S. broadcast operator countermeasures have made it more costly for pirates and less reliable for end users.

In the 2010s, with the continued development of high-speed broadband networks, advanced compression, and other enabling technologies, it became possible for pirates to rip TV channels from official sources on an industrial scale and stream the video across the Internet in near-real-time. Live streaming websites became a common way to watch premium TV channels and sports events for free, albeit with poor quality video and annoying pop-up advertisements.

As legitimate streaming grew in popularity, so-called "piracy devices and apps" emerged as an alternative to websites, often providing a better user experience and enable users to easily watch through their television sets. Users purchase a streaming device, often pre-configured by the manufacturer, the reseller, or an intermediary, to access pirated content. Such a "fully-loaded" box is sometimes branded by a particular illegal IPTV service. Alternatively, users can purchase a device without preinstalled piracy apps, then load and "upgrade" the device with the apps necessary to access pirated content. These devices typically use free add-ons for the Kodi media player, and/or ad-financed pirate IPTV apps.

More recently, as a variety of legitimate subscription services became available for IPTV linear television, pirates created their own versions, offering subscription IPTV services for live channels and sports. This is called "Pirate Subscription IPTV", or "PS IPTV" — the ecosystem NAGRA researched for this report.

NAGRA brings a unique level of experience and expertise to this investigation of PS IPTV. The organization developed significant intelligence about these services since they began emerging as a serious threat to the legitimate market. NAGRA has advised content owners, pay-TV operators, and law enforcement on how to address these threats.

NAGRA's insights into this ecosystem result from devoting considerable time and resources to understanding and analyzing its component parts. NAGRA identifies and automatically crawls thousands of websites and online marketplaces, also known as "storefronts," that sell subscriptions to PS IPTV services across the world. NAGRA accumulates data on these services, including language, prices, currencies, and channel lists, and classifies the services across geographical markets. It regularly gathers metrics on how popular each of these storefronts is from multiple internet sources, including Google, Bing, Alexa, SimilarWeb, Facebook, Twitter, YouTube, LinkedIn, Pinterest, major app stores, and online marketplaces. NAGRA has acquired, tested, and monitored hundreds of PS IPTV services. It has investigated many of these services in depth to assist law enforcement activities and has supported a number of high-profile legal cases around the world.[8]

This report, utilizing NAGRA's expertise, offers a composite picture of the actors involved in the PS IPTV ecosystem, some of whom know they are engaged in illicit activity, some who may be willfully blind, and others who may not realize they are enabling criminal activity.

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[8] Ernesto Van der Sar. Police Shut Down IPTV Operation With Two Million Subscribers (Torrent Freak, June 10, 2020)
Ernesto Van der Sar. IPTV Supplier Omniverse Agrees to Pay $50 Million in Piracy Damages (Torrent Freak, November 13, 2019)

# The Pirate Subscription IPTV Ecosystem

PS IPTV is predicated on replicating a legal service and offering live programming to consumers, often complemented with a video-on-demand catalog of movies and TV shows. With predictable, recurring revenue and the need to retain their subscribers, PS IPTV operators invest in building the infrastructure and organization necessary to reliably supply large catalogs of high-quality, stolen content.

Researchers found several instances where, as with a legitimate service, the PS IPTV subscriber downloads an app, or uses one already bundled with a set-top device. PS IPTV is also available in the form of simple playlists: the provider supplies a link to a playlist file which the subscriber loads into a generic media player.[9]

Prices for PS IPTV services vary, with some as high as $25 per month and some as low as $2. Over the last two years, NAGRA has observed U.S. market prices mostly in the range of $10 to $15 per month. There has, however, been recent downward pressure on pricing, driven largely by PS IPTV offers available on U.S.-accessible Asian marketplaces such as Alibaba.com. Dropping prices are likely to increase the popularity of these services.

In many cases, the consumer receives a username and password to access the service after paying for a monthly or yearly subscription (by credit card, PayPal, or sometimes by Bitcoin). Because subscribers are paying someone for the content, and because the storefront websites and apps are often well designed, and posing as legitimate, some consumers may believe they are using a legal service.

[9] Examples of such players are VLC (https://play.google.com/store/apps/details?id=org.videolan.vlc) and PerfectPlayer (https://play.google.com/store/apps/details?id=com.niklabs.pp)

Below are screenshots taken from the storefront for a typical PS IPTV service, RocketStreams (rocketstreams.tv).


**Figure 1 – Sample PS IPTV storefront, landing page**

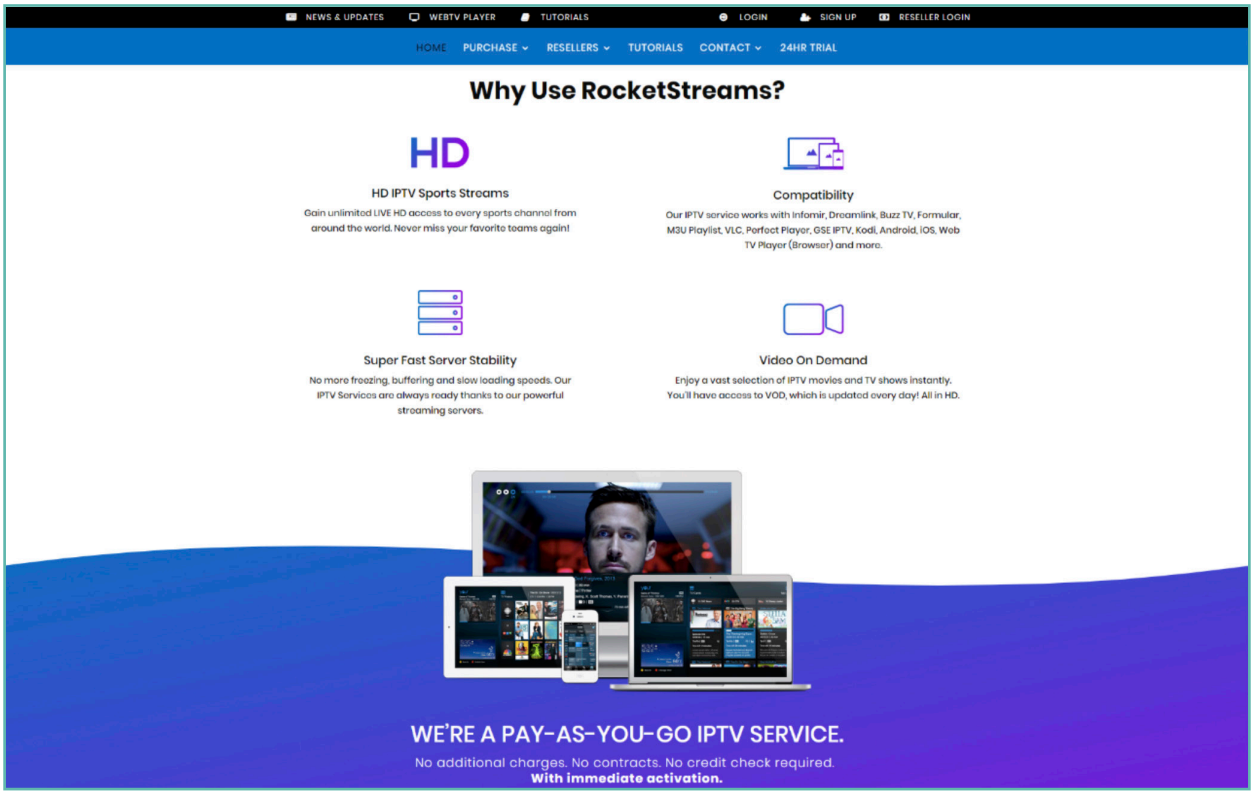



**Figure 2 – Sample PS IPTV storefront, sales pitch**

Below are screenshots illustrating the user experience from a typical PS IPTV app; note their slick appearance and similarity to legitimate services.


**Figure 3 – Sample PS IPTV service, live TV**

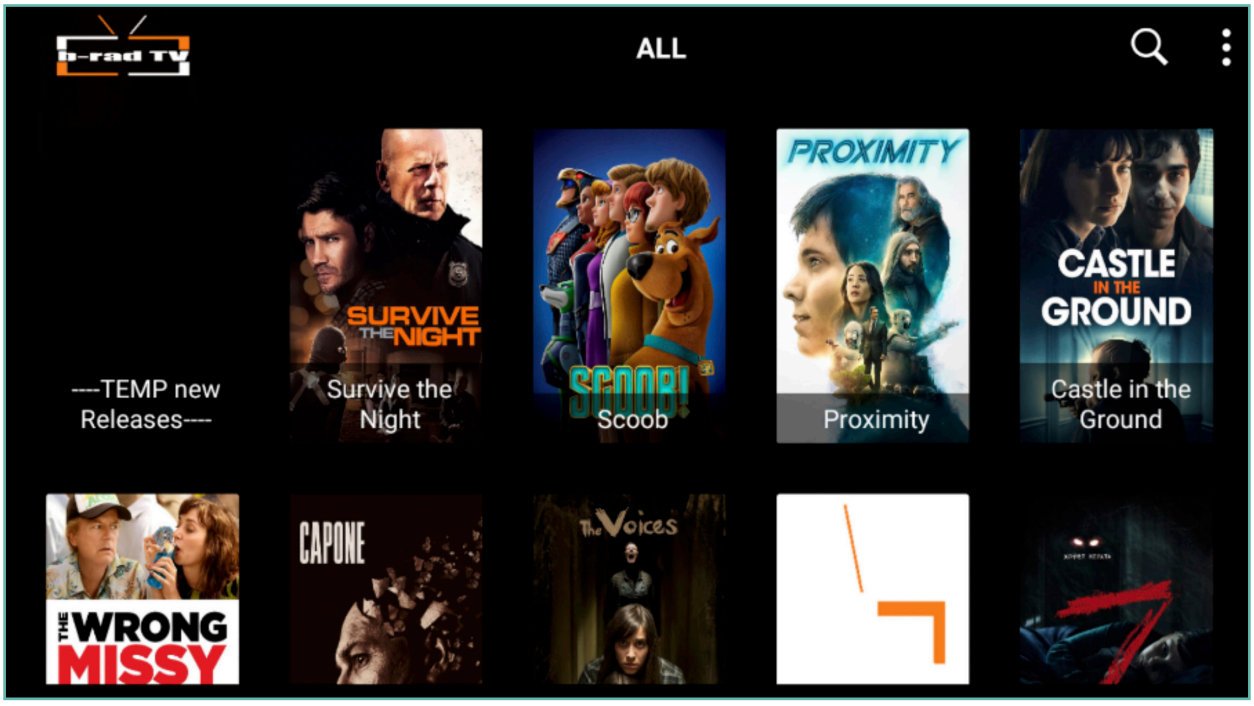



**Figure 4 – Sample PS IPTV service, movies**

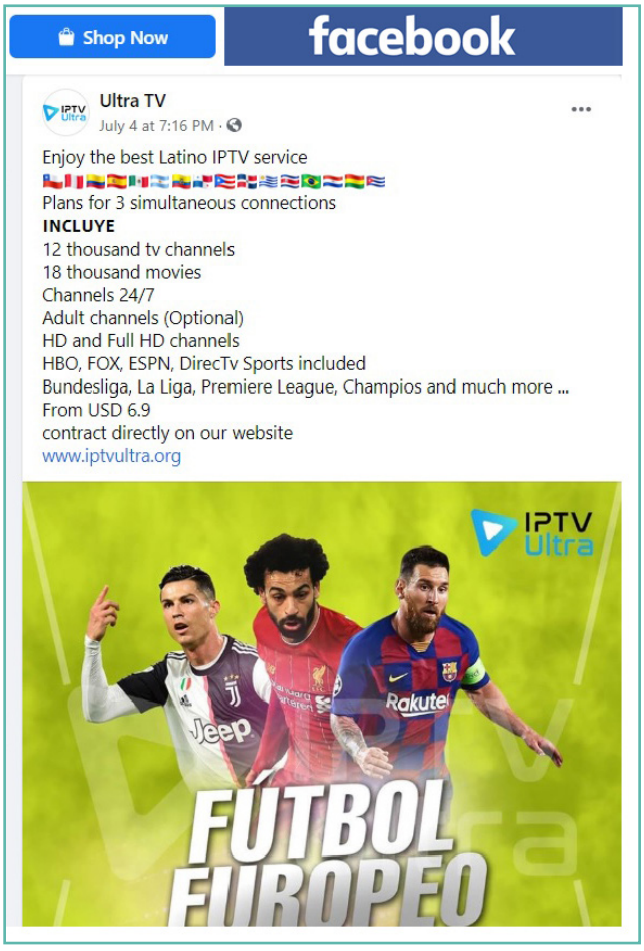
## The PS IPTV Retailer and Wholesaler

The consumer's point of contact with the piracy ecosystem is the **PS IPTV Retailer** (the "Retailer"). The Retailer advertises to the public, often through social media (see Figure 5), driving users to a storefront website where they can download the app, buy a device with the app pre-installed, or otherwise receive instructions on how to access and pay for the services.

Because the providers of PS IPTV services pay nothing for distribution rights, their costs are extremely low, so they can bundle vast amounts of content into their offerings, often including extensive video-on-demand (VOD) catalogs in addition to live channels, for prices legitimate distributors cannot possibly compete with. They do not abide by geographical licensing arrangements, so they can offer a wider variety of content than legal services can, including hundreds to thousands of channels from around the world. And since they have no security restraints, they can be installed on many types of devices.

The Retailer does not obtain the content and technology itself; rather, it relies on others to steal the content and to build and maintain the technology platform. Indeed, the Retailer may be ignorant of how the technology works or how the content is sourced; its expertise may be in direct marketing and sales, especially of illegal products.

**Figure 5 – Sample PS IPTV Facebook advertisement**



Typically, the Retailer purchases its service from a **PS IPTV Wholesaler** (the "Wholesaler"). Often, the Retailer buys "credits" from a Wholesaler to sell a certain number of subscriptions to consumers. The Retailer relies on the Wholesaler's technical infrastructure and access to stolen content to deliver the service to subscribers. The Retailer spends little in upfront costs, and can purchase additional credits from the Wholesaler whenever its customer base expands.

Because it operates out of the public eye and is comprised of many component parts, the Wholesaler infrastructure is more complex to understand and explain than the Retailer's. Many Wholesalers also operate as Retailers, and may have one or many storefronts on which they sell subscriptions directly to consumers. European police forces recently brought to light an example of such an ecosystem, where Wholesalers interoperated to supply dozens of retailers with services, providing PS IPTV to over 2 million subscribers worldwide.[10]

In some instances, a Wholesaler may be a fully integrated operation, gathering the feeds of the stolen channels, developing its own proprietary technology, and using its own servers and software to scrape internet sources for stored movies and television shows for Video on Demand (VOD) services. More commonly, a Wholesaler will outsource or barter for one or more of these functions.

"Restreaming" appears to be a common practice among Wholesalers, which may involve either paying each other for content or bartering one content package for another. It is often too costly for one Wholesaler to steal thousands of channels itself – many of which will be difficult to obtain locally and would not be of sufficient value on the local market – so it's likely to barter or buy the right to restream those additional channels.

[10] ILLEGAL STREAMING SERVICE WITH OVER 2 MILLION SUBSCRIBERS WORLDWIDE SWITCHED OFF (EUROPOL, June 10, 2020)

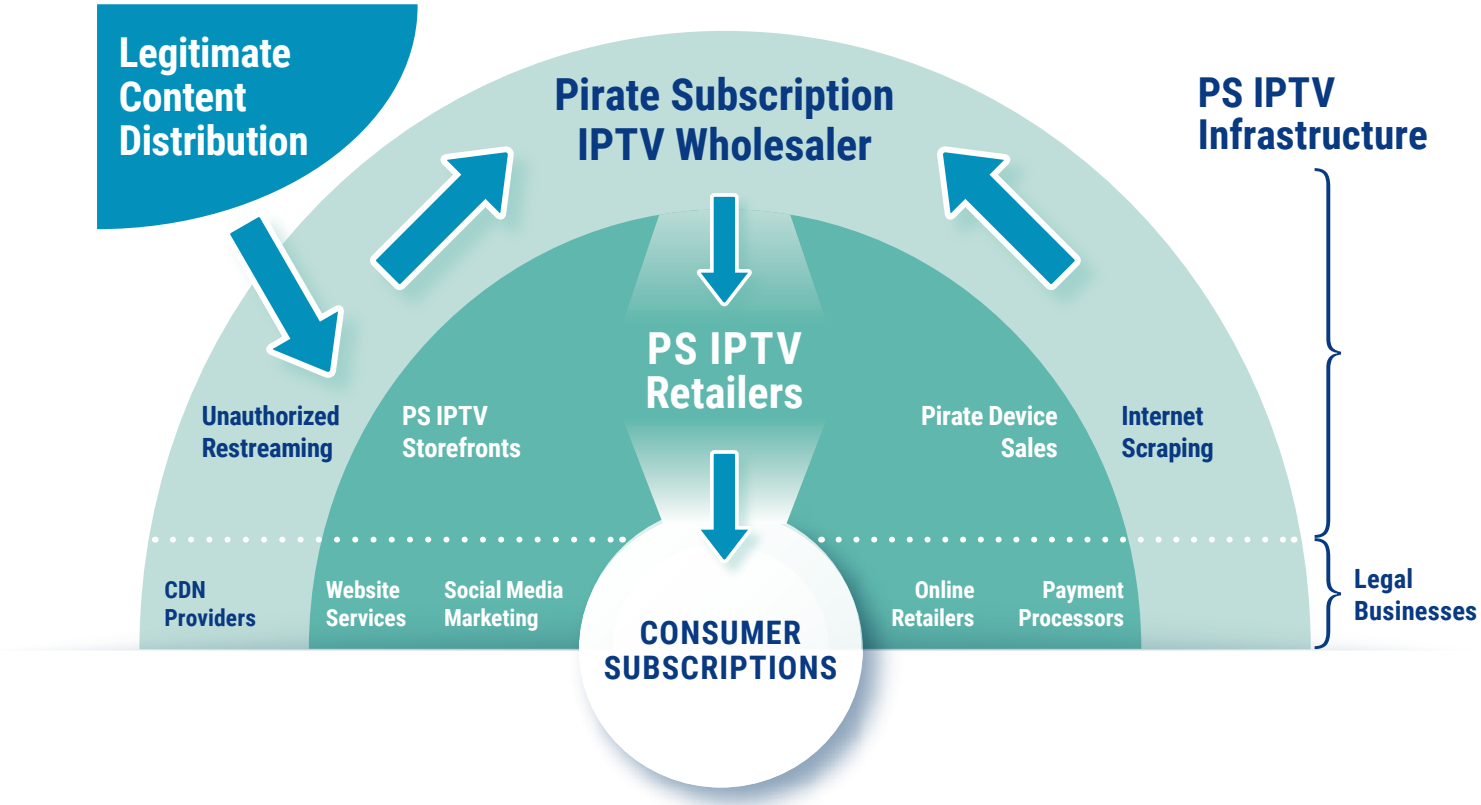
## The Legitimate Players Supporting the Wholesale and Retail PS IPTV Services

Supporting the pirate Retail and Wholesale services, which are clearly illegal, are a number of legitimate service providers that may or may not know they are supporting illegal activities. These include:

- ***Payment processors, including credit card companies,*** which are used by consumers to pay their subscription fees.
- ***Hosting providers*** *and* ***Content Delivery Networks***, which are used by both the Retailers and Wholesalers to support their websites and video infrastructure.
- ***Website services***, which provide publisher tools to create and manage PS IPTV storefronts and domains.
- ***Social media marketing***, on sites like Facebook and YouTube which are used to generate traffic to PS IPTV storefronts.

The diagram below maps out the players in the complex PS IPTV Ecosystem and their relationship with each other. A more detailed description is available in the appendix.

**Figure 6 – PS IPTV Ecosystem**



# The Profitability of Pirate Subscription IPTV Services

The approximate total revenue of the U.S. PS IPTV ecosystem can be calculated by multiplying the average subscription price paid by consumers by an estimated number of U.S. subscribers. As noted above, NAGRA has seen prices for such services in the U.S. vary, but uses the lower $10 per month estimate in its calculations.

The optimal method for estimating the number of subscribers to PS IPTV services is to observe the actual network traffic exchanged with servers belonging to known pirate subscription services. For years, the network intelligence company Sandvine[11] has deployed network management devices over a significant number of fixed access networks in the U.S. to measure traffic to all sorts of endpoints on a collective, anonymized basis.

By this means, Sandvine extracted metrics on the traffic exchanged with known pirate servers. In a 2019 report,[12] Sandvine estimated that "6.5 percent of North American households access known subscription television piracy services." This estimate was based on observing the traffic across "multiple tier-1 North American fixed access networks" and searching for network signatures corresponding to a large number of known subscription television piracy services that Sandvine has studied in its labs.

Sandvine, however, has not defined signatures for *all* piracy services used on the rapidly developing U.S. market. After consulting with Sandvine, NAGRA made the assumption that the services Sandvine has studied are those that generate the most traffic and represent as much as 80 percent of all U.S. television piracy subscriptions. Adding the remaining 20 percent increases the percentage of households accessing PS IPTV services from 6.5 to approximately 8 percent of North American households.

[11] Sandvine company website
[12] Subscription Television Piracy (Sandvine, 2019)

According to Statista and Point Topic, the number of fixed broadband subscribers in the U.S. was approximately 112 million in 2019.[13] Assuming the U.S. ratio of PS IPTV users is equal to the average ratio of North America, 8 percent of 112 million equates to approximately:

**9 million fixed broadband subscribers using PS IPTV services.**

Multiplying that subscriber figure by the average subscription price of $120 per year yields a projection of **$1.080 billion** in U.S. PS IPTV revenues per year.

This revenue estimate is conservative, as it does not consider: (i) sales of piracy devices; (ii) the possibility of households subscribing to multiple pirate subscriptions; (iii) pirate subscriptions that consumers may access through mobile devices; or (iv) any supplementary income the ecosystem may derive from other illegal activities, such as spreading malware.

Using an alternate method that relies on its database of 3,500 PS IPTV storefronts, NAGRA suggests that the number of fixed broadband subscribers using PS IPTV services could be as high as 11.9 million, which would substantially increase the revenue estimate. But NAGRA chose to rely on the more conservative estimate out of an abundance of caution.[14]

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[13] Number of fixed broadband subscribers by country in the 1st quarter of 2019 (statista, September 2019)

[14] NAGRA estimates that as many as 30 million individuals view pirate subscription IPTV in the United States. These 30 million individuals, in a country with an average 2.52 individuals per household , represent 11.9 million households with broadband subscriptions, about 33 percent above the estimate derived from the Sandvine data.

# Splitting the Billion-Dollar Pie

The previous section of this paper estimated the revenue to the U.S. PS IPTV ecosystem as a whole; this section breaks down the revenue and expenses of a typical Retailer and typical Wholesaler to better understand the profit margins inherent in this business.

## The Retailer: Revenues and Costs

As noted above, NAGRA has identified roughly 3,500 Retailer storefronts that sell subscriptions to U.S. consumers.[15] NAGRA estimates that a large PS IPTV Retailer may have in the order of 100,000 subscribers.

One high-profile former Retailer is Bill Omar Carrasquillo, a.k.a. OMI IN A HELLCAT, who claimed to be earning up to $200,000 *a day* from his pirate IPTV service Gears TV.[16] He has also claimed that the FBI seized at least $5.2 million from his bank accounts, as well as large collections of luxury cars and jewelry.[17]


**Instagram Photo of 'Gears' Operator**

In general, however, because of the low barriers to entry, the retail PS IPTV market is quite fragmented. Many retailers each have only several thousand customers, or fewer.

Therefore, for the purpose of understanding the operations and profitability of PS IPTV services, NAGRA analyzed the revenues and costs of a medium-sized Retailer with about 5,000 subscribers, selling subscriptions for $120 per year.

This Retailer's revenue can be estimated at $120 x 5,000 = **$600,000 per year.**

[15] Example: IPTV Subscription (iptv-subscription.com)

[16] Andy Maxwell. OMI IN A HELLCAT: Selling Drugs to Making "$200k a Day" From Pirate IPTV (Torrent Freak, January 4, 2020)

[17] Andy Maxwell. FBI Seized "At Least" $5.2m From Bank Says Gears Reloaded IPTV Boss OMI IN A HELLCAT (Torrent Freak, December 16, 2019)

On the cost side, the Retailer operation can operate profitably with very few employees, and low capital expenditures at the outset, so costs are primarily ongoing operating expenditures to maintain the business. A Retailer must set up a storefront website for advertising, sales, and customer service, then recruit customers for their service. It buys "credits" from a Wholesaler (as described above), allowing it to register new customers for the IPTV service, in a "pay-as-you-go model," making a margin off each new customer.

While Wholesaler pricing vary, in NAGRA's experience such credits generally cost in the order of $4 per subscriber per month, when credits are purchased, as often as necessary, in batches of 1,000. Providing a 12-month service to a customer requires 12 credits, a cost of $48 per subscriber. The following tables estimate upfront and recurring expenditures for a PS IPTV Retailer with 5,000 subscribers:

| Upfront costs | | Unit cost | Units | Cost |
|---|---|---|---|---|
| **Storefront website** | | | | |
| Development | 10 man-days web developer | $250 | 10 | $2,500 |
| **Total** | | | | **$2,500** |

| Yearly recurring costs | | Unit cost | Units | Cost |
|---|---|---|---|---|
| **Subscriptions** | | | | |
| | 12 credits per yearly subscription | $48 | 5,000 | $240,000 |
| **Management & sales** | | | | |
| | 50% non-technical administrator | $50,000 | 0.5 | $25,000 |
| **Total** | | | | **$265,000** |

**In this example, a PS IPTV Retailer with just 5,000 subscribers can expect to make a yearly profit of over $335,000 on an estimated $600,000 in annual revenues.** That's a robust **56 percent** profit margin. Moreover, because this is an illegal business, it is highly unlikely that the PS IPTV Retailer is reporting this income to the Internal Revenue Service, so that profit may be tax-free.

As noted, some PS IPTV Retailers charge $15 per month in the U.S., and still attract customers, as the price point remains significantly below legitimate services that do pay programmers for the right to distribute the content. In that case, the revenue would be $900,000, and the costs would be roughly the same, leading to an even higher profit and margin.

## PS IPTV Wholesalers

As in any business, retail is only half the story. **PS IPTV Wholesalers** make up a sizeable and lucrative component of the illegal streaming ecosystem.

As noted above, there is not a rigid division that separates Wholesalers and Retailers. Many Wholesalers also operate storefronts from which they sell to the public. Approximately 15 percent of the 3,500 Retailer storefronts in the U.S. market advertise wholesale packages in addition to individual subscriptions.

Some Wholesalers are less transparent. Past NAGRA investigations have revealed Wholesalers that rarely sell openly through a storefront, but instead communicate to would-be Retailers through closed internet forums or direct e-mail. Thus, identifying these Wholesalers systematically is challenging.

Based on its research, NAGRA estimates that a large Wholesaler may serve streams — through multiple retailers — to millions of subscribers worldwide. This research is rooted in close scrutiny of these operators. For example, NAGRA assisted the investigation that led to the June 2020 Spanish National Police raid[18] that took down dozens of related PS IPTV brands, serving over 2 million subscribers worldwide. NAGRA discovered 566 domain names pointing to the raided servers, many of which included terms that suggest that they are used to sell or deliver PS IPTV services.

While there may be other massive Wholesalers, NAGRA's research suggests that a more typical Wholesaler may service about 30,000 subscribers. NAGRA looked at the revenue, costs, and profit margins of such a Wholesaler and, for simplicity's sake, assumed this Wholesaler had no direct retail revenue or costs.

**Revenues.** A PS IPTV Wholesaler generates revenue by selling restreaming "connections" to other Wholesalers and by selling subscription "credits" to resellers.

[18] International coalition brings down piracy ring boasting 40,000 video channels and VOD content, and 2 million subscribers (NAGRA, June 16, 2020)

A typical Wholesaler sells restreaming connections for $6 per subscriber per month. One connection allows redistribution of one channel to as many consumers as needed.

Based on past investigations, such a Wholesaler may sell restreaming conections for 200 U.S. channels to 10 other Wholesalers, resulting in a revenue of (10 wholesalers x 200 connections x $6 x 12 months) = $144,000 per year.

This same Wholesaler sells subscription credits to Retailers at $4 per credit, sold in batches of 1,000 credits. Providing a 12-month service to a consumer requires 12 credits, for a cost of $4 x 12 = $48.

Assuming the 30,000 subscribers are all acquired through its Retailers, the Wholesaler's revenue would be ($48 x 30,000) = $1,440,000 per year, bringing the **Wholesaler's total revenue to $1,584,000 per year**.

**Costs:** On the cost side, the Wholesaler requires:

- a content theft platform and/or restreaming rights from other Wholesalers;
- a content distribution platform, to stream the stolen content to consumers; and
- a storefront website, to advertise and sell restreaming connections and subscription credits.

**Content theft platform.** A typical Wholesaler may offer a content line-up of 3,000 channels. To assemble that line-up, it will not ordinarily steal all 3,000 channels itself. Rather, to ensure control over the quality and availability of its core offering – the 200 or so most popular U.S. channels - a U.S. Wholesaler is more likely to steal directly only those channels.

The cost of stealing channels from the local market is modest. Powerful content capture and restreaming devices are readily available. For example, the TBS Technologies' TBS2650, sold for $3,000, is capable of simultaneously acquiring 20 HD live channels and re-encoding them on-the-fly for IPTV re-streaming.[19]

[19] https://shop.tbsdtv.com/tbs2650-8-channels-4k--or-20-channels-1080p-hd-hdmi-video-encoder-p-277.html

U.S. satellite broadcasters, such as DirecTV and DISH, provide subscribers with all the major U.S. channels, along with powerful home gateway devices that can descramble and decode many broadcast channels simultaneously. One device from a leading operator, included in the TV subscription, can send different descrambled channels to up to 6 companion devices, each available on lease for an extra $5 per month. So, for only around $100 per month, a Wholesaler can use these receivers to steal 7 channels simultaneously from the satellite feed. In order to obtain and descramble 200 channels, the Wholesaler would need to obtain just 30 retail direct broadcast satellite subscriptions.

The Wholesaler can then purchase or barter for restreaming connections from other Wholesalers for its 2,800 remaining channels. For example, IPTV World (iptv-world.net) boasts 16,000 channels from around the world, available for restreaming at 1,200 euros ($1,355) per month for 1,000 channels. To cover the remaining 2,800 channels, the typical Wholesaler would require 3 batches of 1,000 channels. For a 12-month period, the Wholesaler would pay $48,780 a year.

**Content distribution platform**. To stream the stolen content to consumers, the Wholesaler can rent the appropriate hosted servers, network bandwidth and content delivery network. It also must acquire content and subscriber management software.

**Storefront website**. To sell the service online, the Wholesaler will build and operate a storefront website. With modern web development tools, a professional-looking site can be inexpensive.

**Management & sales**. In addition to these costs, some work will be required to manage the organization and to administer sales.

The following tables summarize estimated upfront and yearly recurring costs for such a Wholesaler:

| Upfront Costs | | Unit Cost | Units | Cost |
|---|---|---|---|---|
| **Content acquisition** | | | | |
| Servers | To steal 200 channels:<br>7 HDMI-to-IP racks for 32 receivers each:<br>• 2 Oupree or TBS devices for HDMI to IP acquisition<br>• Rack, routers, wiring<br>• Admin PC | $15,000 | 7 | $105,000 |
| Redundancy | 20% provisional additional cost for redundancy, to enable recovery from system failures | | | $21,000 |
| Satellite dish | Hardware + installation<br>1 dish + 1 spare + switches & amplifiers | $1,000 | 1 | $1,000 |
| **Storefront website** | | | | |
| Development | 20 man-days web developer | $250 | 20 | $5,000 |
| **Total** | | | | **$132,000** |

| Yearly recurring costs | | Unit Cost | Units | Cost |
|---|---|---|---|---|
| **Content acquisition** | | | | |
| Subscriptions | Premium satellite subs at $100 per month ($1,200/year), including 7 receivers per sub<br>30 subs required for 200+ receivers | $1,200 | 30 | $36,000 |
| Content theft operations | 1 low cost employee per 100 receivers (adequate for a medium quality of service)<br>2 employees for 200 receivers | $30,000 | 2 | $60,000 |
| Restreaming connections | 1,000 channels per month x 3 x 12 months | $1,355 | 36 | $48,780 |
| Premises | Room rental, electricity, misc. | | | $30,000 |
| **Content distribution** | | | | |
| Content management software | Roughly $70 per month for a capacity of 10k clients, $840 per year | $840 | 3 | $2,520 |
| Internet lines (upload) | 2 Gbps yearly subscription, for:<br>100 SD channels at 1-2 Mbps<br>100 HD channels at 2-3 Mbps | $3,000 | 1 | $3,000 |
| Hosted streaming platform & CDN | $8000 per year for 10 Gbps input | $8,000 | 1 | $8,000 |
| Streaming operations | 20% administrator | $50,000 | 0.2 | $10,000 |
| **Storefront website** | | | | |
| Hosted server | Server for website supporting around 100k users | $500 | 1 | $500 |
| Maintenance | 20% web developer/ administrator | $50,000 | 0.2 | $10,000 |
| **Management & sales** | | | | |
| | 50% salesperson | $60,000 | 0.5 | $30,000 |
| **Total** | | | | **$238,800** |

Once the service has ramped up and capital expenditures have been amortized, this typical Wholesaler **would make a yearly profit of over $1,345,200, with a profit margin of 85** percent, also likely tax-free.

These profit margins, for both Retailers and Wholesalers, are astronomical because these business models rely on illicitly distributing millions of stolen copies of valuable works that others created. For a criminal, the business model is irresistible: low barriers to entry, outsourced labor, huge profits, and only sporadic attention from law enforcement.

## Beyond Profits: Harms to Consumers and Others

This report shows how lucrative pirate streaming businesses can be—but the risk that consumers face by falling into the hands of these criminal businesses is less easily quantified.

One of the side effects of illegal PS IPTV services is consumers unknowingly "invite" software, created by criminals, into their home. And these operators have a track record of searching for exploits that generate profits for themselves at the expense of customers and other players in the ecosystem.

For example, researchers have shown content pirates frequently collaborate with hackers and other bad actors, who target users of pirate websites and apps. And PS IPTV operators may, either currently or in the future, engage in the same behavior. In 2019, Digital Citizens Alliance issued a groundbreaking report that showed how piracy streaming apps spread malware.[20] Piracy-driven malware exposes users to software that can:

- hold their data for ransom, by encrypting it;
- steal their personal data, for sale to cyber-criminals; or
- use their device's resources for cryptocurrency mining, distributed denial of service (DDoS) attacks, or other covert activities.[21]

[20] Fishing in the Piracy Stream: How the Dark Web of Entertainment Is Exposing Consumers to Harm (Digital Citizens Alliance, April 25, 2019)

[21] Digital Bait: How Content Theft Sites and Malware Are Exploited By Cybercriminals to Hack Into Internet Users' Computers and Personal Data (Digital Citizens Alliance, December 10, 2015)

In a May 2020 research survey, Digital Citizens Alliance found that those who said they had a piracy device in the home were THREE TIMES more likely to have dealt with a malware issue in the last year than those who didn't have such a device.

Both corporations and U.S. regulators have also raised alarms about the cyber security risks of piracy devices and apps. Microsoft has warned of malware from piracy apps[22] that enables hackers to use a consumer's computer to engage in so-called "coin-mining," the process of creating new digital currency such as Bitcoin. And in 2019 the Federal Trade Commission warned consumers to be wary of malware[23] from piracy devices.

In the course of its research, NAGRA also found pirate services casually distribute content that may put their viewers at risk, including unrestricted adult content, and also banned and unlawful content. For example, out of the hundreds of PS IPTV services monitored in NAGRA labs over recent years, nearly 50 percent included Al-Manar in their channel list. The Al-Manar channel was labeled in 2004 by the U.S. government as a "Specially Designated Global Terrorist entity." It is banned in the United States and in a number of European countries.

Ad-financed pirate IPTV services pose a major risk to advertisers. Because much ad placement by modern ad-brokering systems is programmatic, premium brands face the reputational risk of serving their branded advertising on pirate IPTV services.

Digital Citizens intends to conduct a follow-up investigation of another troubling piracy-related discovery by NAGRA: how suppliers of some pirate services gain access to, and offer for use, the residential internet connections of their users.

This is a technical issue but one with potentially significant implications for U.S. consumers. In some cases, NAGRA found that when Americans used a free pirate service, they either knowingly or unknowingly allowed the service to use their residential internet connection on a de-centralized virtual private network (VPN). Generally, VPN IP addresses come from a

[22] Sergiu Gatlan, Microsoft Warns of Malware Surprise Pushed Via Pirated Movies (Bleeping Computer, April 28, 2020)

[23] Alvaro Puig, Malware from Illegal Video Streaming Apps: What to Know (Federal Trade Commission, May 2, 2019)

data center, making it easier for law enforcement and security experts to determine that the user's traffic is being disguised. Employing residential internet connections, by contrast, makes it difficult to recognize that the user location is being disguised, allowing criminals to more easily fly under the radar of law enforcement or Internet security experts. And when illegal activities - such as viewing child pornography or engaging in so-called click fraud scheme to generate ad revenue - are conducted through a residential internet connection instead of a datacenter, crimes become harder to detect and leave the user looking like the culprit.

As mentioned, thus far this activity has only been observed in free services, but there is nothing standing in the way of operators of subscription services engaging in the same behavior. Digital Citizens intends to investigate the trade in access to residential internet connections and piracy's role in it.

Whether piracy-driven malware, skirting a U.S. ban on terrorist content, the reputational loss to advertisers, or a risk of residential internet connections being misused, the extracurricular activities around piracy streaming, free or subscription, point to a law enforcement challenge.

# Conclusion

Although a billion-dollar criminal industry in the U.S. alone, the PS IPTV services sector has managed to avoid attracting much attention from authorities, including law enforcement, which is hampered by criminal statutes that have failed to keep up with advances in technology. Very little is known about the PS IPTV services sector among policymakers, the press, or the public. There is a broad lack of understanding about how the sector operates, the risks it creates across the economy and society, or that it pays nothing in federal, state, or local taxes, unlike its heavily-taxed legitimate counterparts. Here is what is clear: given its alarming presence in American households, it deserves far more scrutiny.

With over $1 billion in revenues, not including the revenue streams from device sales, advertising, malware distribution, and other sources, and with profit margins as high as 85 percent, the PS IPTV services sector is not going away. In fact, it's likely to grow.

Every indication is that the operators of PS IPTV services and associated support services are sophisticated people executing a savvy, albeit illegal, business plan. The sector frustrates America's creative industries for whom the $1 billion-plus in PS IPTV revenue represents pure theft. But it also affects consumers (through malware), law enforcement (by enticing users to "lend" access to their IP connection that can be used by criminals to better conceal their activities), and government efforts to curb banned content (by giving organizations labeled as terrorists a voice in the U.S.).

Diving deeper into the PS IPTV services sector also shines a light on the participants: those who clearly are engaged in illegal activities, those who provide legitimate services but may look the other way when their customers are bad actors, and those who are unwitting participants. The unwitting should certainly care that they are being used for illegal activities, and those that look the other way may be embarrassed to be found out.

This report should represent the beginning of the inquiry to better understand the illegal PS IPTV services sector, not the end. More research is clearly needed, for example, on the ecosystem for ad-financed services, which presents a series of additional challenges in reaching revenue estimates. And groups such as Digital Citizens Alliance should look more deeply into the consumer risks and illegal side activities that PS IPTV services can lead to.

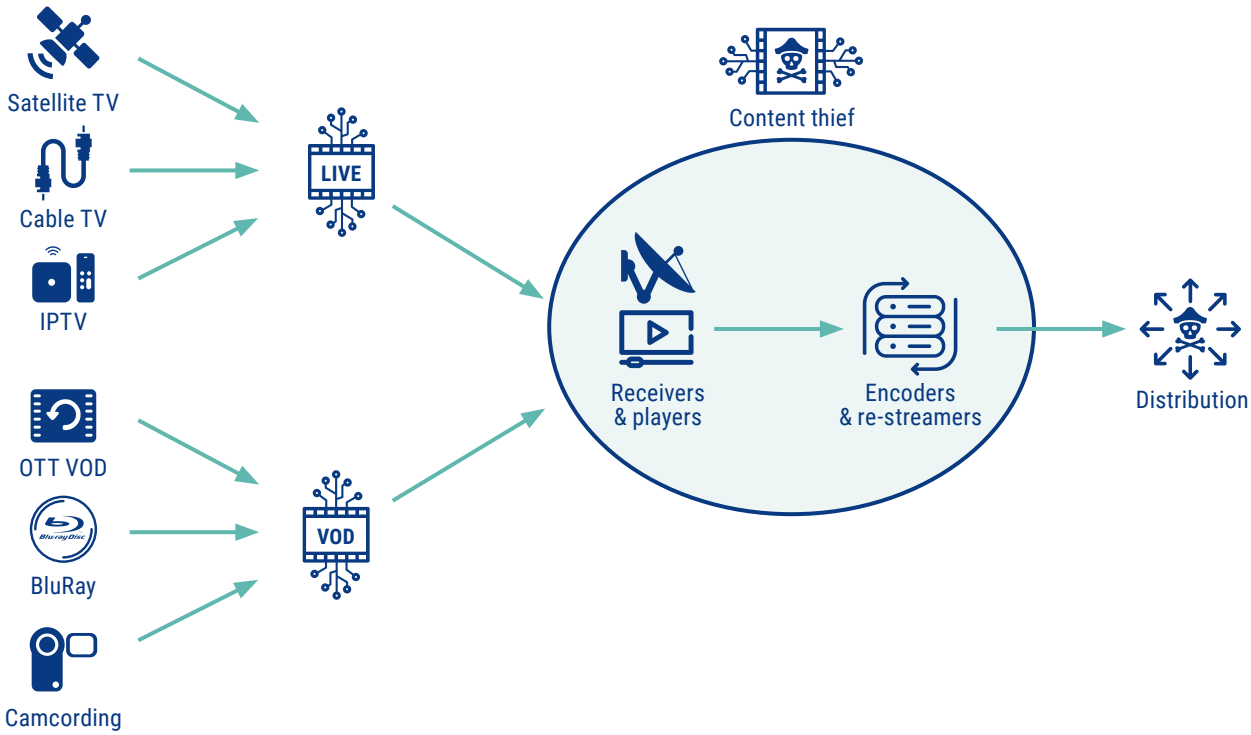
## Appendix

# The Players Behind the PS IPTV Ecosystem

The PS IPTV ecosystem is composed of many actors and roles, some of whom know they are engaged in illicit work, others who operate by the credo of "don't ask," and others who may have no idea they are participating in an illicit or illegal endeavor. Given the complex web of providers, this report includes this appendix to describe the players and demonstrate their roles.

The figure below summarizes the content theft process for PS IPTV piracy. Whatever the distribution method and business model, piracy starts with a thief.

**Figure 7 – Content theft**



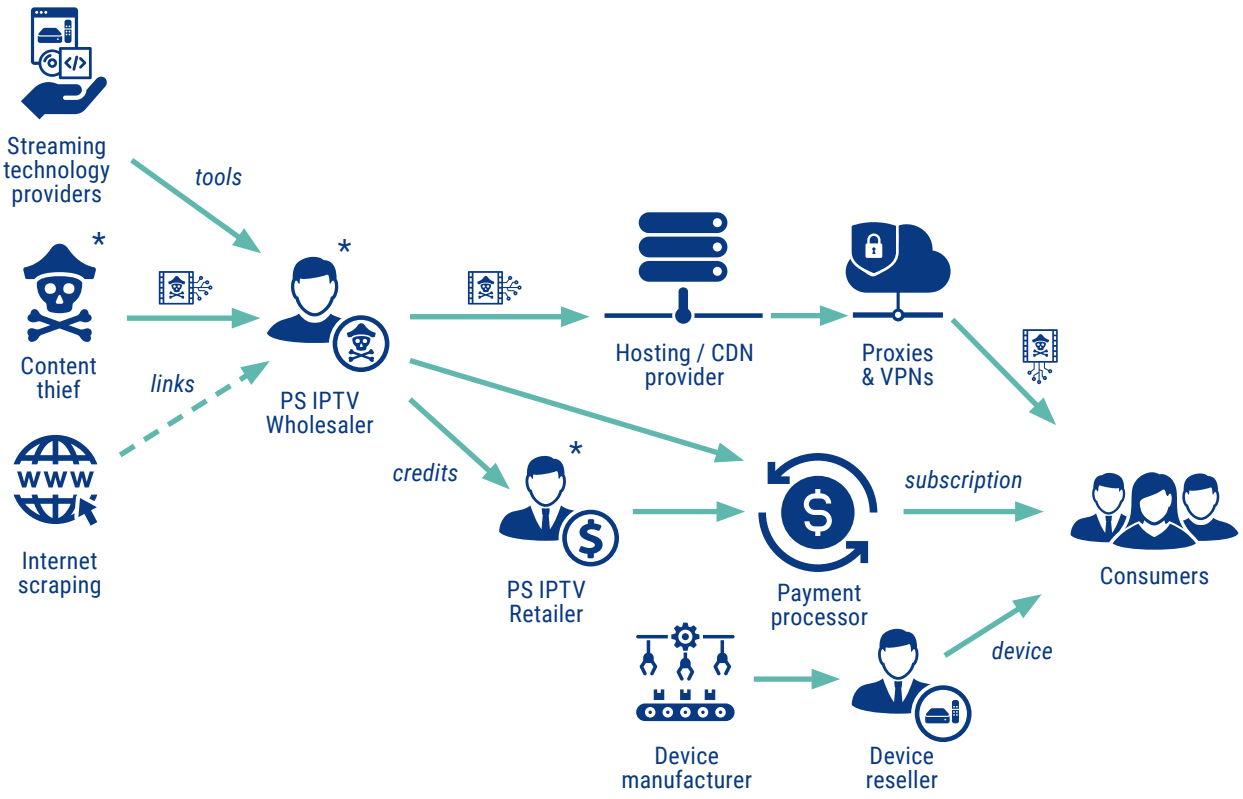
Here's a thumbnail of the players:

| | |
|---|---|
|  | **CONTENT THIEF**<br>Acquires content (both live channels and video on demand titles) from any combination of legitimate sources.<br>The thief circumvents content protection measures to capture the content and re-encode it for retransmission. This is enabled by a variety of off-the-shelf tools available on the open market: HDMI rippers, BluRay rippers, digital camcorders, encoders, etc.<br>Content thieves are often the PS IPTV Wholesalers, though some specialize in just content theft, selling their content to Wholesalers for distribution. |

The figure below summarizes the pirate ecosystem for **subscription IPTV**, listing the main roles in distribution of unlicensed content. Examples of actors fulfilling each role are provided hereunder as footnotes. This figure differentiates Pirates (marked with a star * ), who are clearly acting illegally, from Enablers, who contribute to the illegal activity but often bear little liability.

The consumers themselves may or may not know they are using an illegal service.

## Figure 8 – Content distribution, subscription IPTV



Here's a thumbnail of those players:

### PS IPTV WHOLESALER[24]

Aggregates content from content thieves and other wholesalers, sells content packages wholesale to subscription retailers and to restreamers, i.e. other wholesalers.

Often performs also as a subscription retailer, selling subscriptions directly to consumers.

The wholesaler builds and operates the streaming infrastructure, integrating solutions supplied by the streaming technology providers. Sometimes this includes providing the client software (app) required to view the content, other times it involves relying on generic media player apps, such as VLC, PerfectPlayer or Kodi.

The wholesaler operates an "IPTV panel" web application, for retailers to manage their user accounts and content packages.

Some wholesalers include a pre-integrated streaming device, for a plug & play home experience.

Some wholesalers run affiliate programs, whereby affiliate members (e.g. YouTubers or other influencers) display web links to offers for the IPTV service and are paid a commission on sales.

### PS IPTV RETAILER[25]

Either online or in a physical store, sells subscriptions to the IPTV service, with or without a streaming device, either under the wholesaler brand, or rebranded.

Does not own or operate the streaming infrastructure, relies on the wholesaler for this.

### PAYMENT PROCESSOR

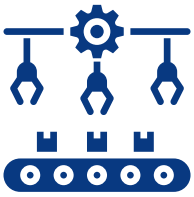
Processes payments from customers to the retailer.

Pirates use the same processors as regular businesses: VISA, Mastercard, PayPal, etc., though some prefer Bitcoin payments.

### STREAMING TECHNOLOGY PROVIDERS

Provide either individual components or largely pre-integrated solutions for streaming content to end users: encoding devices,[26] streaming management software,[27] streaming middleware,[28] generic media player software that loads playlists,[29] etc.

[24] RocketStreams (rocketstreams.tv), OK2 IPTV (ok2iptv.com)
[25] IPstreams (iptvstreamers4less.com/store)
[26] Oupree (oupree.com), TBS Technologies (tbsdtv.com)
[27] Xtream-UI (xtream-ui.com), StreamCreed (streamcreed.com)
[28] Infomir (infomir.com), ipMacro (ipmacro.com), AceStream (http://www.acestream.org/)
[29] PerfectPlayer (play.google.com/store/apps/details?id=com.niklabs.pp), IPTV (play.google.com/store/apps/details?id=ru.iptvremote.android.iptv)

| | |
|---|---|
|  | **HOSTING/CDN PROVIDER[30]**<br>Hosts the servers required to stream the content to consumers. Multiple providers might be used by each pirate service, hosting authentication server(s), front-end streaming server(s) and Content Delivery Network nodes.<br>Some providers specialize in hiding customer identities and / or being non-compliant to abuse notifications.[31] |
|  | **PROXY PROVIDER[32]**<br>Funnels all communications through a proxy service, that protects IPTV servers from attacks such as distributed denial of service attacks (DDoS). Also hides these servers from external scrutiny, thus impairing abuse notification and investigation efforts. |
|  | **VPN PROVIDER[33]**<br>Anonymizes the user of the IPTV service, by encrypting his/her communications and making them appear to originate from a different location, anywhere in the world. This both protects piracy users from investigation and allows them to circumvent any server access restrictions implemented by local network operators. |
|  | **DEVICE MANUFACTURER**<br>Provides a streaming device able to receive and display the video content over the Internet.<br>This includes generic Android set-top boxes[34], USB TV sticks, smart phones, tablets, personal computers, etc. but also purpose-built set-top boxes that are dedicated to IPTV.[35] |
|  | **DEVICE RESELLER**<br>Sells streaming devices to consumers, either online or in a physical store.<br>Mainstream resellers[36] sell pristine devices that can potentially later be configured for piracy.<br>PS IPTV retailers may provide a dedicated device as part of a subscription IPTV service.[37] |
|  | **CONSUMERS**<br>Access unlicensed content through an application running on a mobile device, a set-top box plugged into a TV, or a computer.<br>May or may not be fully conscious the IPTV service is illegal. |

[30] BlueHost (bluehost.com), Private Layer (privatelayer.com)
[31] Examples are available at uncensoredhosting.com/offshore-hosting-reviews
[32] Cloudflare (cloudflare.com), Koddos (koddos.net)
[33] NordVPN (nordvpn.com), HMA (hidemyass.com)
[34] Examples can be found here: https://www.amazon.com/s?k=Android+TV+Box
[35] Infomir (infomir.com), Dreamlink (dreamlinkstore.com)
[36] Amazon (amazon.com), Best Buy
[37] Zaap TV (zaaptv.com)

## About Digital Citizens Alliance

The Digital Citizens Alliance is a nonprofit, 501(c)(6) organization that is a consumer-oriented coalition focused on educating the public and policymakers on the threats that consumers face on the Internet. Digital Citizens wants to create a dialogue on the importance for Internet stakeholders—individuals, government, and industry—to make the Web a safer place.

Based in Washington, DC, the Digital Citizens Alliance counts among its supporters: private citizens, the health, pharmaceutical and creative industries as well as online safety experts and other communities focused on Internet safety. Visit us at digitalcitizensalliance.org

## About NAGRA

NAGRA, the digital TV division of the Kudelski Group (SIX:KUD.S), provides security and multiscreen user experience solutions for the monetization of digital media. The company provides content providers and DTV operators worldwide with secure, open and integrated platforms and applications over broadcast, broadband and mobile platforms, enabling compelling and personalized viewing experiences. Please visit dtv.nagra.com for more information and follow us on Twitter at @nagrakudelski.



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