



Cheats, Hacks, and Cyberattacks Threats to the Esports Industry in 2019 and Beyond

Mayra Rosario Fuentes and Fernando Mercês



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For Raimund Genes (1963-2017)

Contents

6

Who are involved in esports?

7

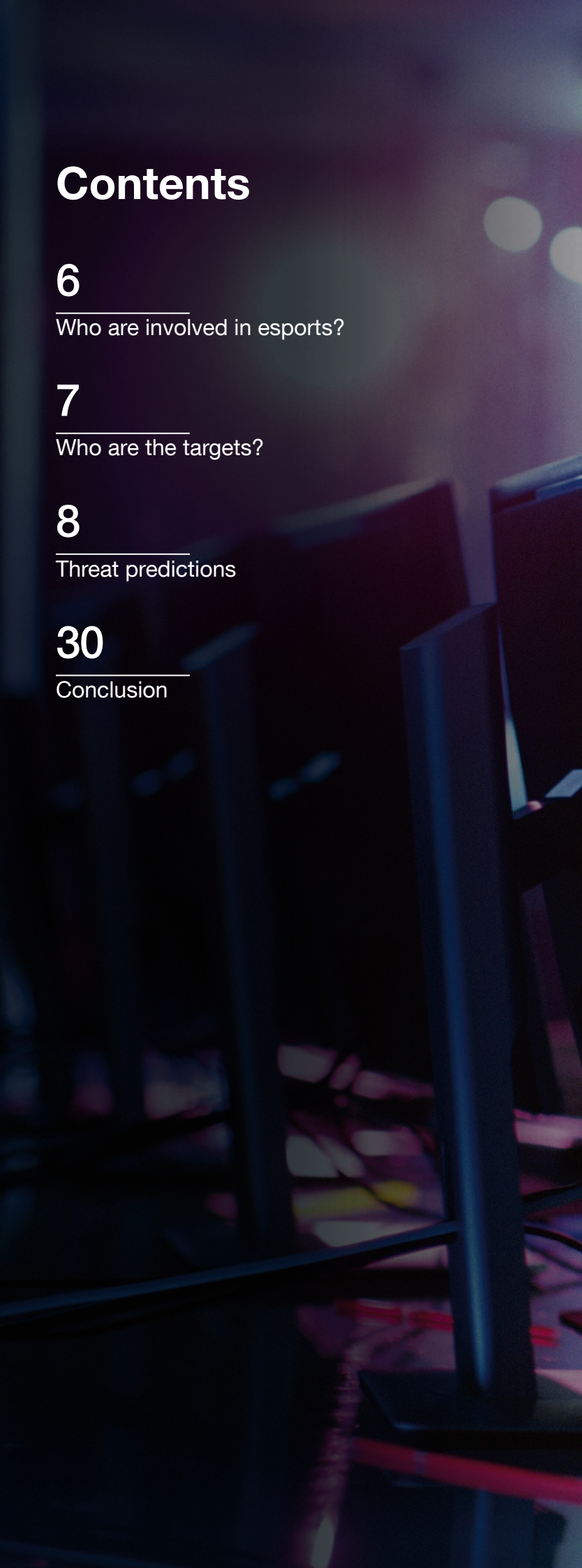
Who are the targets?

8

Threat predictions

30

Conclusion





Electronic sports, more commonly called esports, is positioned to be a billion-dollar industry in 2019, buoyed by growing ad revenues, sponsorships, media rights, and viewership.¹ Events that previously catered to a niche market are now considered mainstream entertainment, with major esports tournaments held in full-sized stadiums and fans coming in from all over the world. Cash prizes from these competitions are also increasing.² The total prize money for esports competitions reached \$150.8 million in 2018 — a significant increase from the \$112.1 million prize pool in 2017.³ In 2019, The International 9, the largest Dota 2 tournament of the year, awarded more than US\$30 million in prizes, taking the record for awarding the largest prize pool for a single esports event.⁴

Several universities in the United States and the United Kingdom have also started offering esports programs for those who want to enter the field, further legitimizing it as a viable career for young adults.⁵ This progress shows how esports has evolved past being just entertainment; these hugely popular gaming competitions are now a thriving business. However, as an industry grows and becomes more lucrative, those who are involved in the business also become more attractive cybercrime targets.

Esports titles are individual or team-based games that are played worldwide in leagues or tournaments on PCs, gaming consoles, and mobile devices throughout the year. The competitions are typically watched by live audiences, and streamed on video platforms like Twitch and YouTube. In the United States, ESPN and TBS have broadcasted esports tournaments on cable networks. Viewership for these competitions has reached all-time highs — the 2018 League of Legends World Championship had 1.9 million peak viewers, logging a total of 78.8 million hours watched.⁶

A study done by Syracuse University predicts that esports viewership will compete with — and even surpass — traditional sporting events by 2021. Their data projects that esports in the U.S. will have more viewers than every professional sports league but the NFL.⁷

The esports industry is a fast emerging target because the systems and infrastructure around it are still maturing. Its increasing popularity is also pulling in more investors and sponsors— and where there is money to be made, cybercriminals will predictably turn up.

Large cash prizes can motivate unscrupulous players to look for an unfair advantage over other players, which in turn creates a market for game cheats in the underground. These competitions also bring out underground entities looking to take advantage of esports for political, financial, or ideological reasons. Possible attacks can involve distributed denial of service (DDoS) and ransomware attacks, zero-day exploits, data breaches, supply chain attacks, and targeted malware. The lucrative esports market also attracts cybercriminals involved in illegal gambling and online bookmaker services.

These attacks can lead to identity theft, financial loss, and reputational damage to business advertisers and sponsors (major brands, like Coca-Cola, Intel, Nissan, ESPN, ABC, Disney, Red Bull and Mercedes-Benz, have all been involved with esports).

We predict that cybercriminals will increasingly target the esports industry over the next three years. Many cybercriminal underground forums already have sections dedicated to gaming or esports sales. The market for stolen gaming accounts and hacks are flooded, much like the market for stolen credit card accounts.

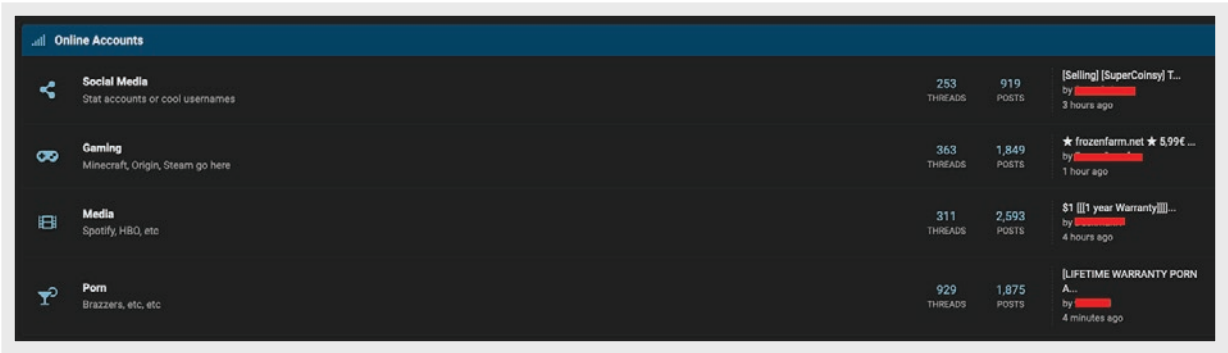


Figure 1. Underground Forum with a dedicated section for the sale of gaming accounts

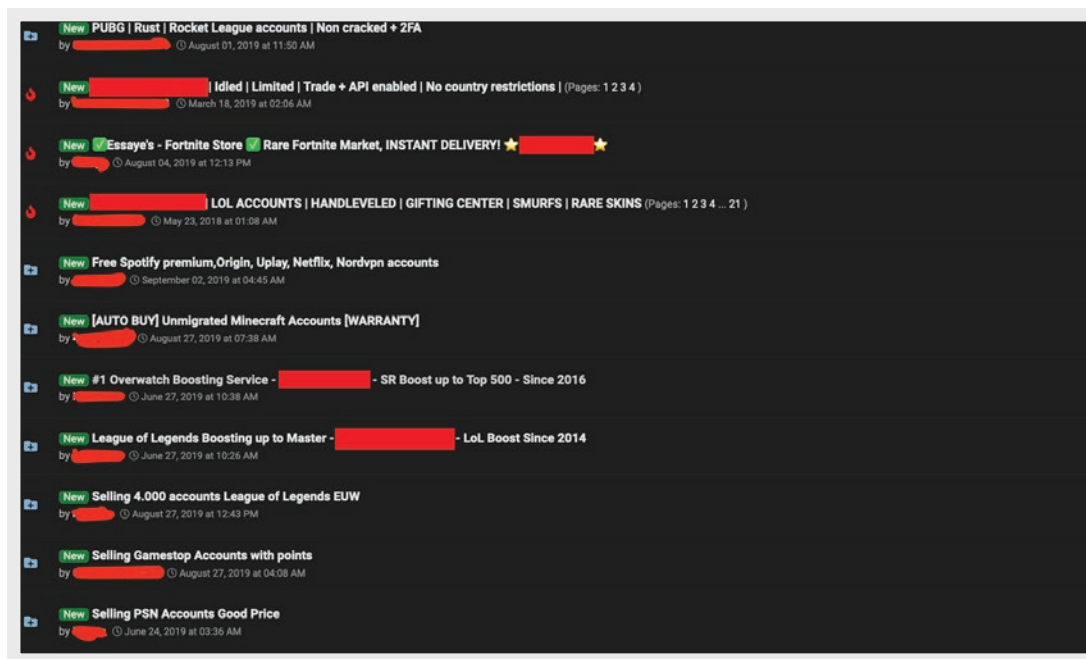


Figure 2. Underground offerings related to esports

The gaming community has long been a target for cybercriminals who have since made a slight shift to go after the growing esports industry. These threat actors have found different ways to monetize hacks for various esports activities, and these items are gaining popularity. For example, since 2018, gaming-related advertisements have increased by 40% in underground markets where gaming accounts and credit card accounts are sold. Cheats can be purchased for as little as US\$20 from multiple online forums, while custom-made hacks can go for much higher, as these are designed to be more difficult to detect during professional tournaments. While anti-cheat and account-banning technologies exist for most competitive game titles, certain high-profile incidents have proven that players are willing to risk their accounts and reputations to win thousands in prize money.

Who are involved in esports?

The target base for esports includes game developers, sponsors, viewers, and players. We are particularly concerned about threats to esports players in the U.S., as it's the country with the most active competitors. According to a report by Statista, the U.S. has the most number of active esports players, which is almost triple the number of players in the country coming in second, South Korea.⁸

On the other hand, the number of esports viewers is higher in Asia. A 2019 report by Statista⁹ shows that 57% of frequent viewers and enthusiasts resided in the Asia Pacific region. This leads us to believe these two regions will be the most targeted in the future.

- The U.S. had more active competition players, followed by China and Korea, each with over 1 thousand active esports players.¹⁰
- China has the largest esports revenue market.
- The Chinese city of Hangzhou, which will host the 2022 Asian Games, features an esports academy, a themed hotel, theme park, business center, and a hospital designed for esports players.¹¹

In addition, esports appears to be growing rapidly in the Middle East, with the United Arab Emirates (UAE) constructing the region's first dedicated esports venue: the Dubai X-Stadium. The rise of esports in the MENA region is due to high internet and smartphone penetration rates. The video game industry in the Middle East is estimated to be worth more than \$1 billion annually, and is expected to increase to \$4.4 billion by 2022. The UAE, Jordan, and Syria are the first Arab countries to participate in The International 9 Dota 2 qualifiers in 2019.¹²

Other regions also have a significant presence in this market. In 2018, Brazil had 11.4 million viewers, accounting for almost half of the esports viewing audience in Latin America.¹³ The Russian government officially recognized esports in 2016 as a sporting discipline; 38% of the online Russian population watch gaming video content. Russia's gaming market reportedly reached 1.8 billion in 2018, with 65.2 million players.¹⁴ In 2018, Japan had 67.6 million gamers, with the majority playing on mobile platforms.¹⁵

Who are the targets?

This research paper discusses the predicted threat landscape of the esports industry based on current and emerging threats and rising market trends. We will cover threats against online game developers, businesses that sponsor and organize tournament events, individual gamers, stream viewers, and event attendees.

Before we start with our threat predictions, let's define the different parties or roles that make up the esports industry:

- **Game developers/publishers** – Companies, such as Valve Corporation (Dota 2) and Riot Games (League of Legends), that develop and release games
- **Gamers** – The people who play video games casually or professionally
- **Professional players** – Competitive players paid by sponsors or teams to play a game.
- **Professional teams** – A team or franchise backed by an owner, comprised of players and coaches that usually receive a contract, health benefits, and a full-time salary
- **Leagues** – A franchise approach based on North American professional sports wherein teams compete in regular season matches to qualify for post-season “elite” competitions
- **Sponsors** – Companies that sponsor teams, events, prizes, etc.
- **Advertisers** – Companies that advertise products and services in the events
- **Attendees** – The audience for esports events, which can pertain to physical event attendees or viewers of online streaming platforms like Twitch or YouTube.

The section below covers the threats that target the abovementioned parties.

Threat predictions

Cheats and hacking services will flourish underground

As esports revenues and tournament prizes continue to increase, unscrupulous players will look for opportunities to exploit the game to gain an advantage over competitors. A quick search for hacks on cybercriminal underground forums reveals hundreds of *aimbots* and *wallhacks* — essentially cheat tools prohibited in official competitions for sale. Aimbots are a type of software used in multiplayer first-person shooter games to provide varying levels of automated targeting that gives the user an advantage over other players. Wallhacks allow the player to change the properties of in-game walls by making them transparent or nonsolid, making it easier to locate or attack enemies. Prices for such tools start at US\$5, but we found an aimbot being sold for \$1,500.

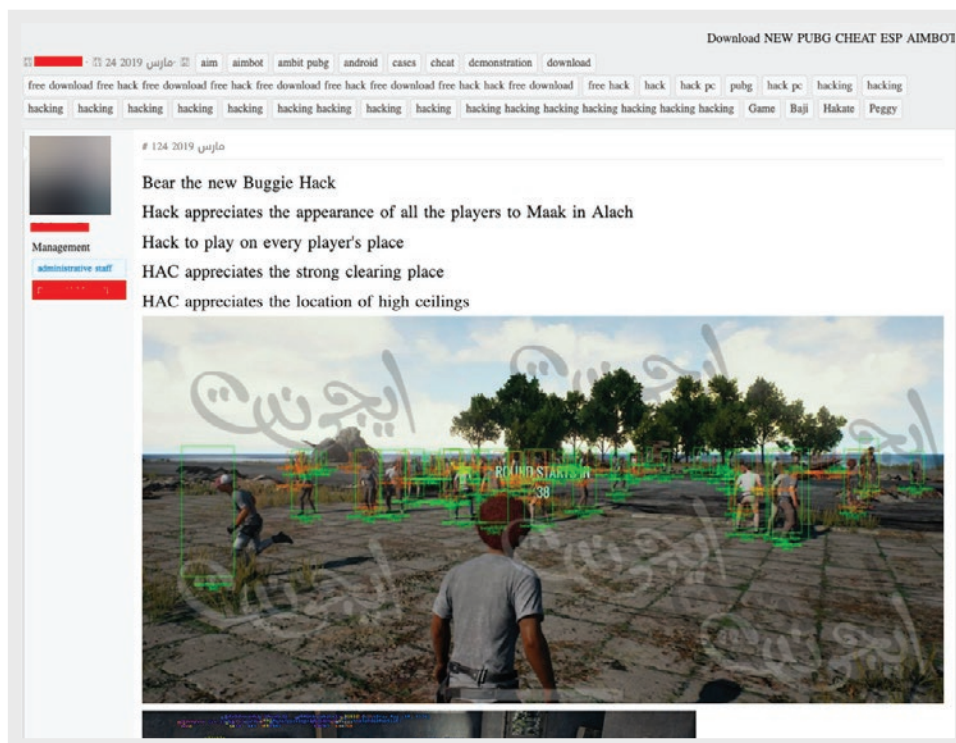


Figure 3. A post on an Arabic forum offering a free aimbot for PUBG, with a download link to a Russian website

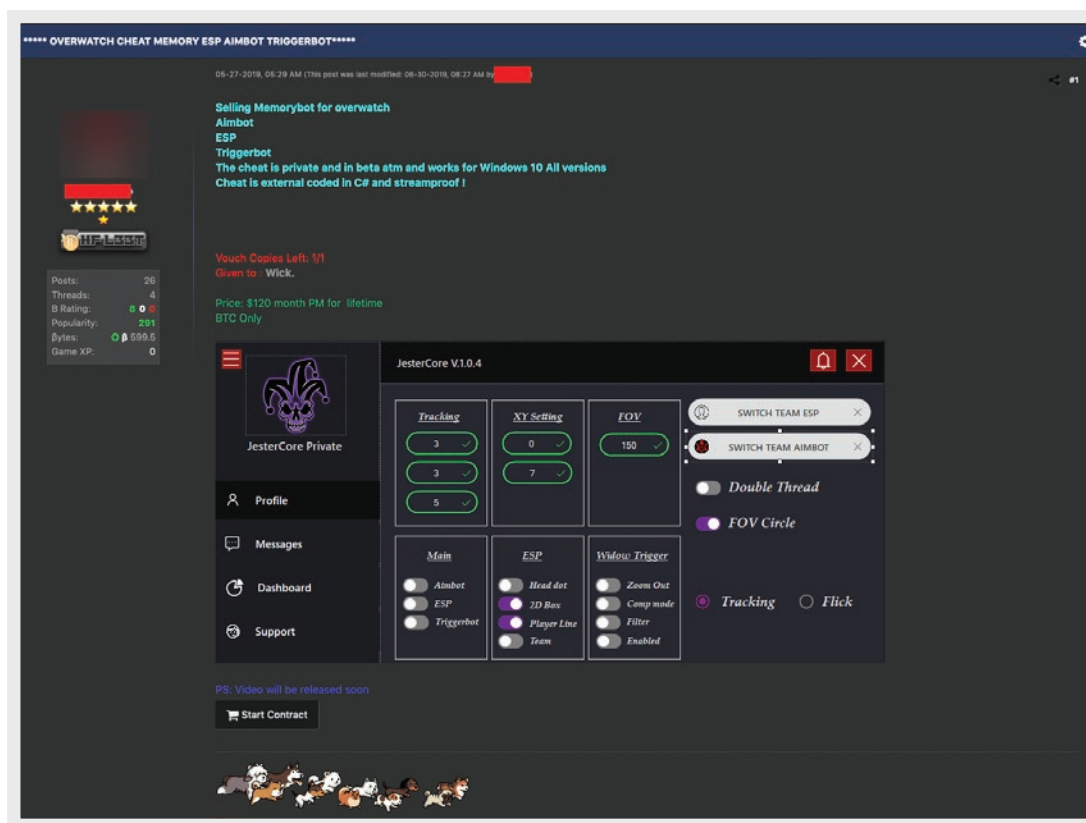


Figure 4. An advertisement for a private cheat for Overwatch

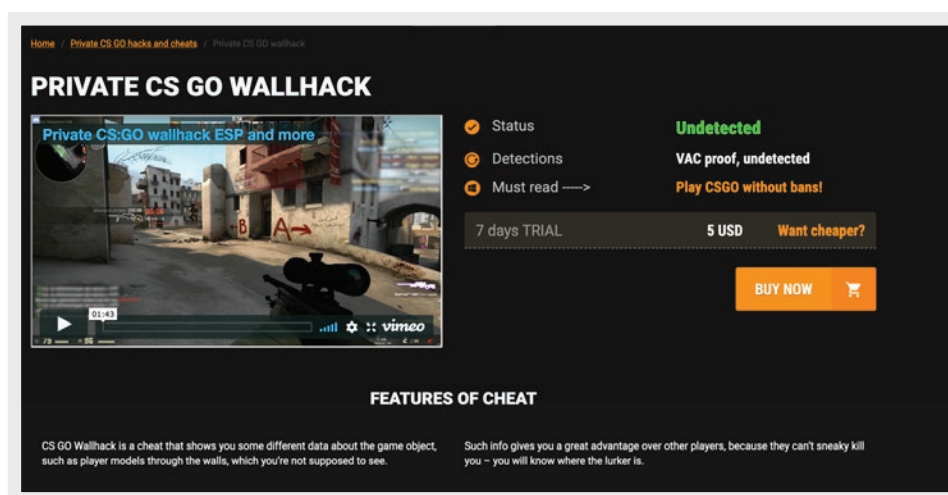


Figure 5. A page selling a private wallhack

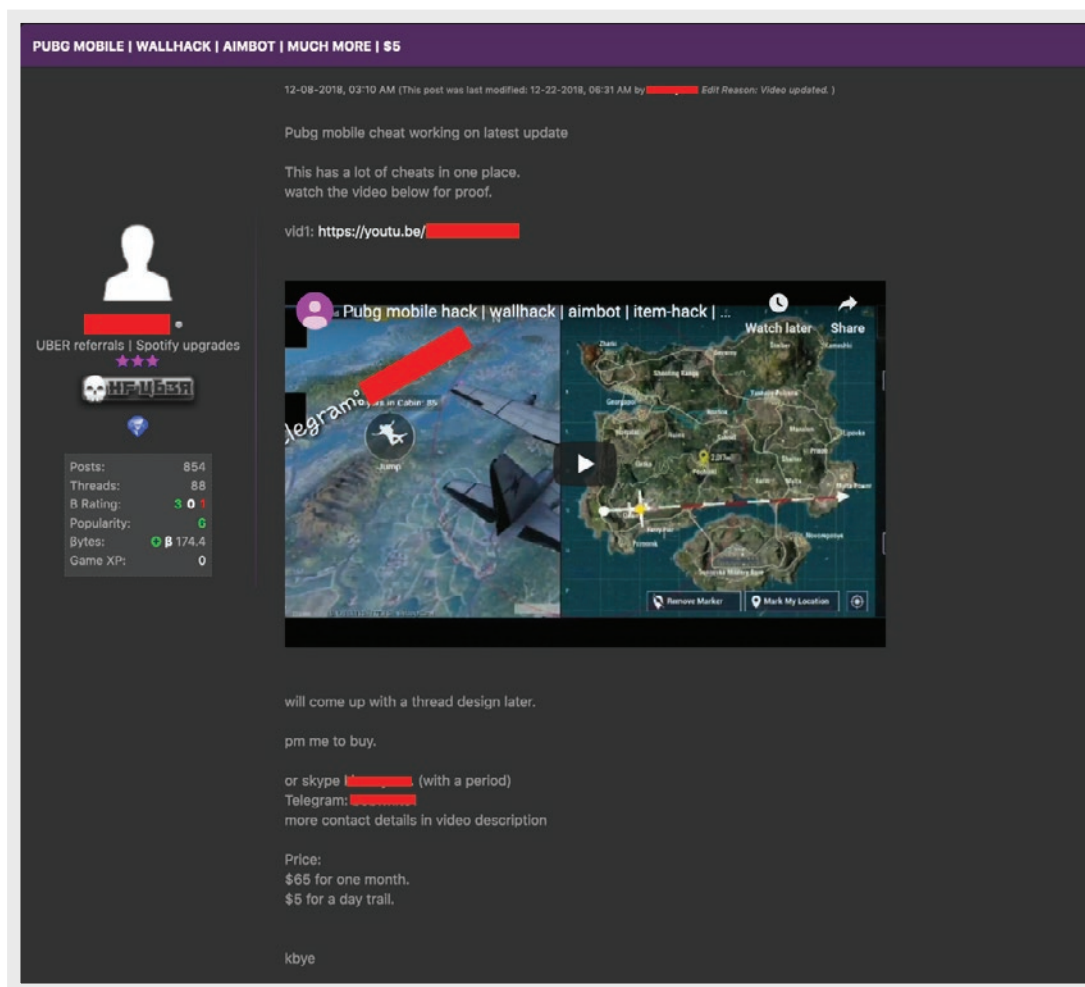


Figure 7. A forum post selling wallhacks and aimbots; prices start at US\$5 for a one-day trial

Players found using such tools do get banned when caught, and some have been caught running cheats during major esports events. The Counter-Strike: Global Offensive (CS:GO) player known as “Forsaken” was banned for five years after he was caught using an aimbot during the eXTREMESLAND ZOWIE Asia tournament in 2018. The player tried to disguise the program by using “word.exe” as a filename.¹⁶

This happened because the players were allowed to use their own computers in this particular tournament. Each tournament sets their own rules regarding the devices the players are allowed to bring, such as computers, headphones, mice, and keyboards.

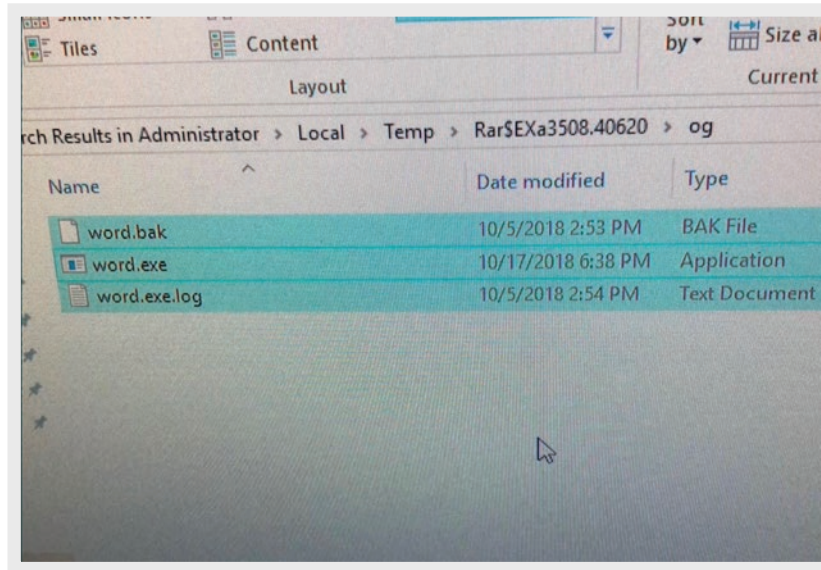


Figure 8. The files that tournament judges found on Forsaken's computer

Players cannot sign up for a professional tournament if they have been banned for cheating on other gaming titles. However, one way to overcome bans is to purchase stolen accounts that have a clean gaming history. We predict an increase in attacks that aim to steal gaming accounts, which would parallel the trend of messaging and social network account theft through phishing and malware. Caches of these accounts typically wind up being sold fairly cheap in the cybercriminal underground market.

Pay-for-play: Score-boosting services

We also expect “boosting” to become more popular in cybercriminal underground forums. Boosting involves a player allowing another player to log into his or her account and play to increase their levels or leaderboard standings. We have found several boosting-for-hire services in the underground market, shown below:

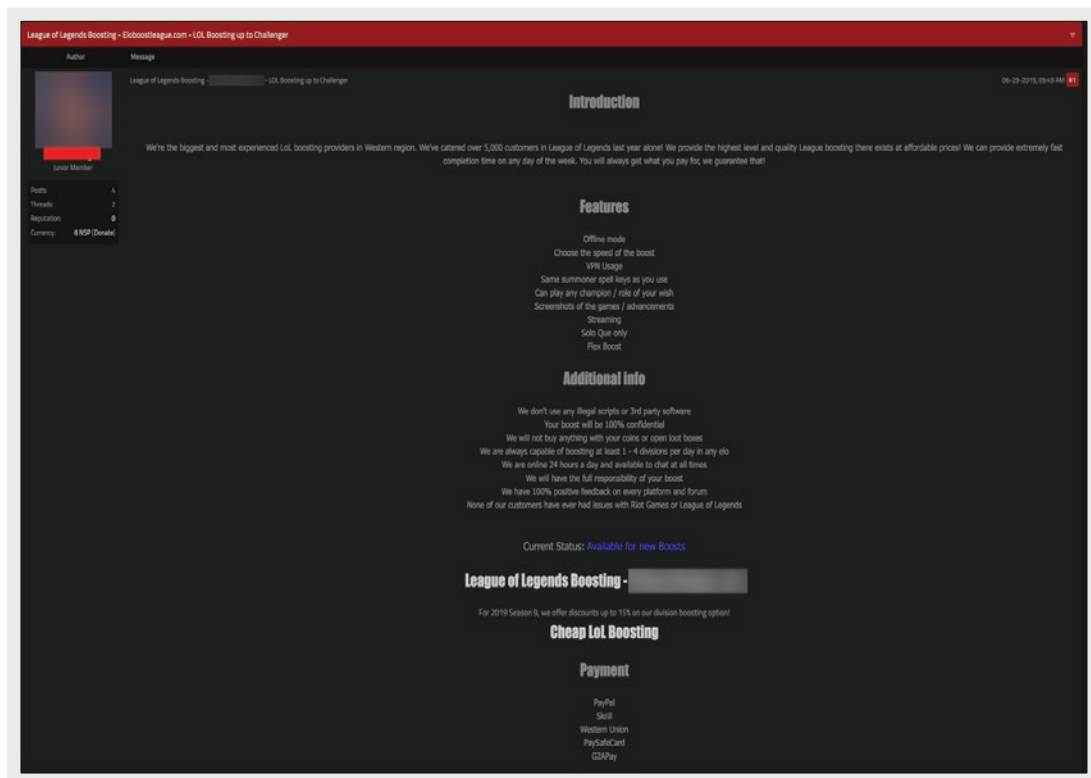


Figure 9. Forum post offering a boosting-for-hire service for League of Legends

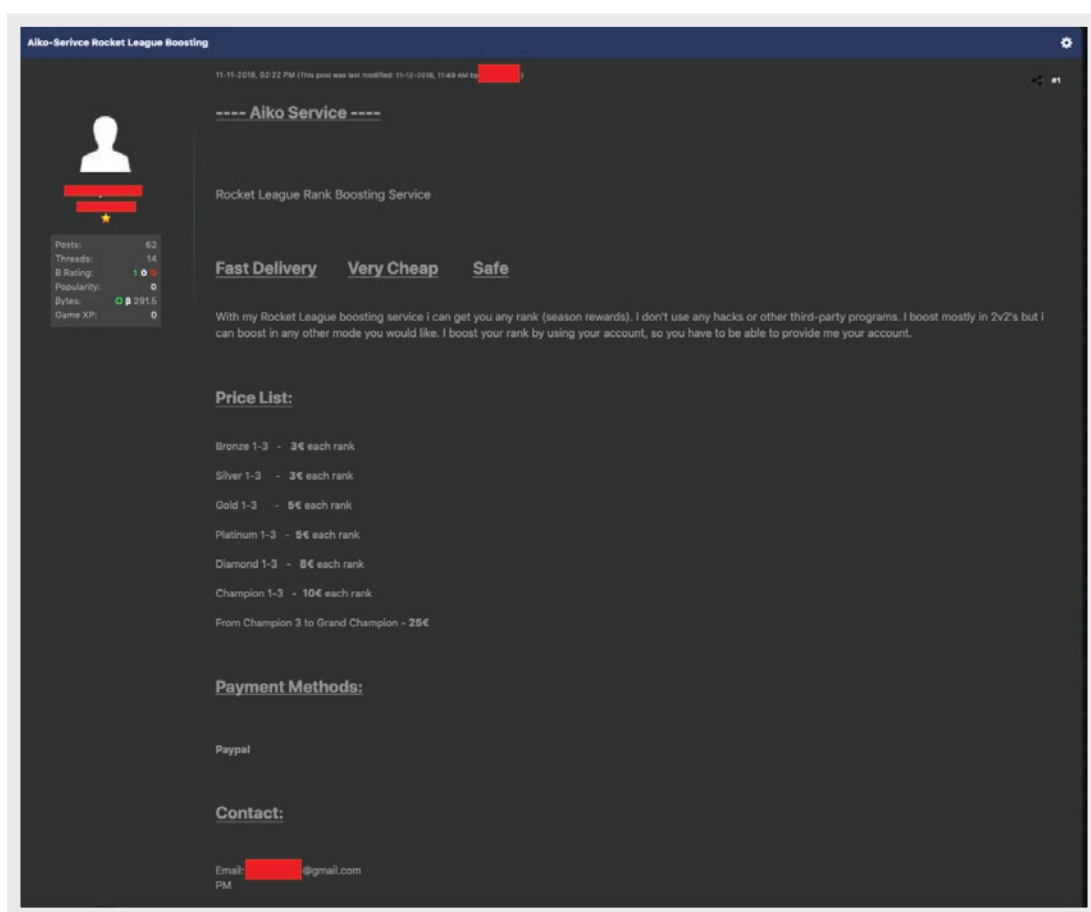


Figure 10. Another post offering a boosting service for League of Legends

There have been players caught boosting, and esports entities have made it clear that the practice will result in severe penalties. In February this year, twelve Overwatch players in China were banned for boosting. The twelve players have also been banned from all future Blizzard-endorsed tournaments — the first ever such ban given.¹⁸ In early 2018, South Korea passed a law that made boosting illegal in the country. Offenders face a stiff fine if caught.¹⁹

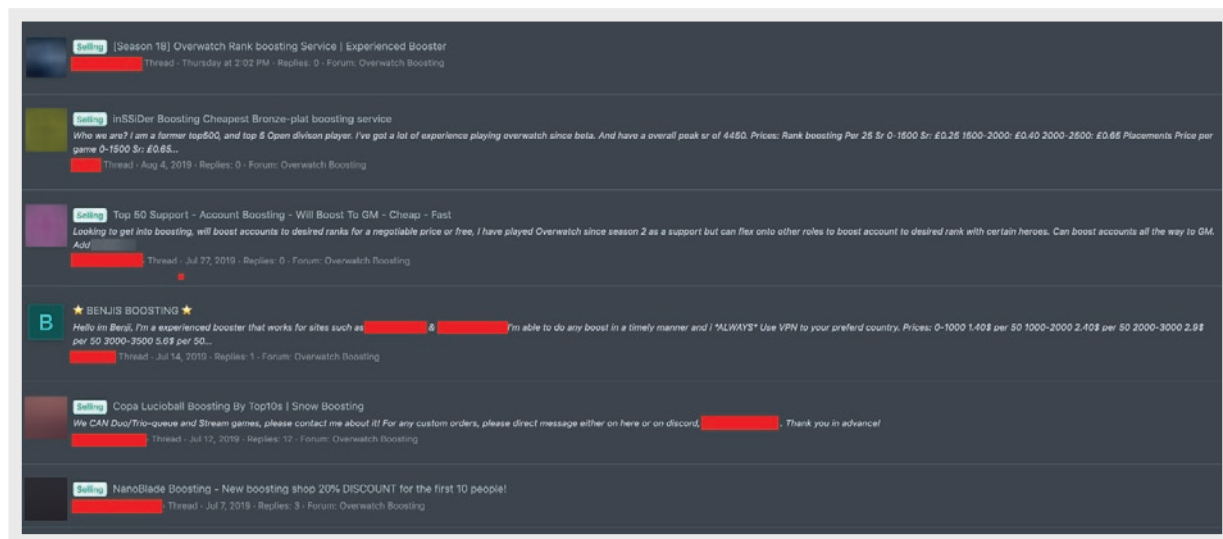


Figure 11. Boosting service offered by elite players

Players can also use other techniques to gain an advantage: one example is stream snipping. This is when a player sees the screen of another player using someone else's Twitch stream, which allows one to see other players' locations and current moves. Players caught doing this can also get a lifetime ban from certain competitions.²⁰

Hidden hardware hacks

Cheating in esports competitions is not limited to software hacks — hardware used in competitions can be manipulated as well. For each tournament, a gaming board sets the rules on what equipment they allow tournament participants to use. A lot of professional tournaments allow players to bring their own mouse and keyboard, which have been known to house hacks.

Nearly a year ago, a Dota 2 team was disqualified from a \$15 million tournament after judges caught one of its members using a programmable mouse. The mouse allowed the player to perform movements that would be impossible without macros (a shortcut of preset key sequences not possible with standard non-programmable hardware).²¹

In 2018, the player “Ra1f” was caught using an advanced hardware cheat for Counter-Strike: Global Offensive that bypassed ESEA anti-cheat technology. Ralf later confessed, and admitted to paying 400 Euros for the exploit. This is how it worked:

- The main computer has both CS:GO and the needed ESEA client (anti-cheat software) installed, like any other ordinary CS:GO installation
- The second computer (let’s call it the “attack PC”) has a special software installed ready to receive data
- The main computer has a physical DMA (Direct Memory Access) device plugged into a PCI Express (PCIe) slot
- A USB cable connects the DMA device to the attack PC
- The DMA device sends data via the USB cable to the attacker PC, and the main computer captures and parses it
- After parsing the data, the attack PC sends it to a Raspberry Pi
- A mobile phone connected to the Raspberry Pi via Wi-Fi downloads the data, which includes all player locations and puts it on the screen, providing the cheater with the positions of his enemies²²




Figure 12. PCI Express equipment used for cheating

We have also seen hardware hacks that require a hardware board such as an Arduino or a Rubber Ducky USB. Rubber Duckys, which cost around US\$45, are typically used for penetration testing, but their capabilities allow them to be misused. Hardware boards are readily available on places like Amazon, but

underground sellers offer the hardware with other cheats for an additional fee. These legitimate tools are used to carry cheating software, and some members of the underground have become proficient at creating and selling these for profit — one website offered custom hardware starting at \$500.

BYPASS THE STRONGEST ANTI-CHEATS WITH RUBBERDUCKY OR HARDWARE BOARDS



Our private CS GO cheats have been coded to work with non-local hardware such as hardware boards. By using a hardware board or the RubberDucky method combined with our cheat software, you can bypass even the strongest anti-cheats such as ESL and Facelt.

If you want to bypass Facelt, ESL or other strong/LAN anti-cheats, you need to use either of the two following methods:

1. Hardware boards. The Arduino UNO board looks like a small motherboard and can be loaded with software (such as private cheats) that inject when you plug it in via USB.
2. RubberDucky/BadUSB. This method consists of using the software RubberDucky and your mouse, keyboard, headset or any other hardware. It works by adding the cheat files into your mouse where it will inject from, leaving no traces of software running on your PC. The RubberDucky (or BadUSB) method also works with Android phones.

These two methods are similar to what Flusha and Forsaken used.

Figure 13. Gaming private cheat website suggesting users purchase a Rubber Ducky or hardware board to use with their hacks.

What we provide

We provide you the latest and greatest of hardware cheats for Counter Strike: Global Offensive and many other popular games. Our cheats provide you outmaxed performance at any of your LAN tournaments. With our hardware tools you have the chance to become a clutch legend meanwhile staying off the radar with our unique DMA controller technology.

- ✓ Undetected by any Anticheat
- ✓ Easy use on LAN
- ✓ Maximum performance
- ✓ Most legit cheats
- ✓ Affordable price

Standalone Microcontrollers

Standalone Microcontrollers are tiny computers which are able to process and modify Physical Memory Tables using a Direct Memory Access through the motherboard of a machine. No modification of the motherboard is required since the microcontroller uses the PCI ports to access the Memory directly on hardware level. This is the perfect solution for Tournament participants who bring their own system to the event.

Built in USB devices

You are not allowed to bring your machine and you are not allowed to plugin USB sticks? No problem. With our customized gear you can still cheat at LAN events and tournaments safely. You can choose the gear yourself and let us know which one you like. However, it has to be out of the box which means we have to purchase it. We can modify the gear (except headsets) and add in cheats to most of USB devices such as Mice and Keyboards.

USB Sticks (no DMA)

Our modified USB sticks are loaded with silent cheat injectors which can load cheats into the game within an eye blink. This is the perfect solution for Players who do not want to spend as much money on an extremely secure cheat and are allowed to connect USB devices at the tournament or have at least access to the USB ports of a system. Keep in mind that these are not using our DMA methods and could be detected. They have not ever been detected until today. However, we would like to warn you that the possibility persists.

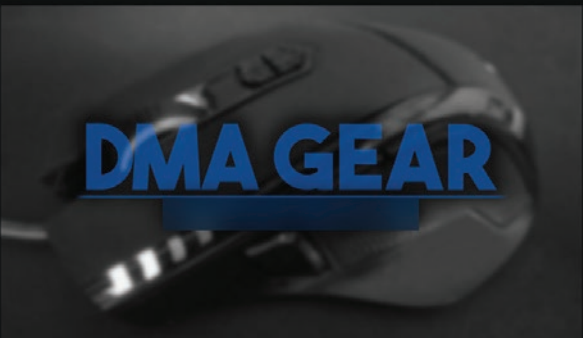


Figure 14. Page offering custom hardware hacks, with prices starting at US\$500

DDoS services will be used to disrupt games

There is a clear risk of disruption when we consider DDoS and esports events. DDoS attacks cause serious lag issues in a competition where every second matters — they can be used to influence and even fix matches. This can affect revenue, tournament schedules, sponsors' reputations, legal online betting, and even get a team disqualified. DDoS incidents have already caused disruptions at esports tournaments.

In several English-speaking cybercriminal underground forums, users often ask how to attack game servers such as Fortnite and PUBG. Members sell DDoS tools or offer DDoS-for-hire services, and some even offer DDoS protection applications for gamers. There are offers of multiple free or paid tools and services starting from \$10 a month.

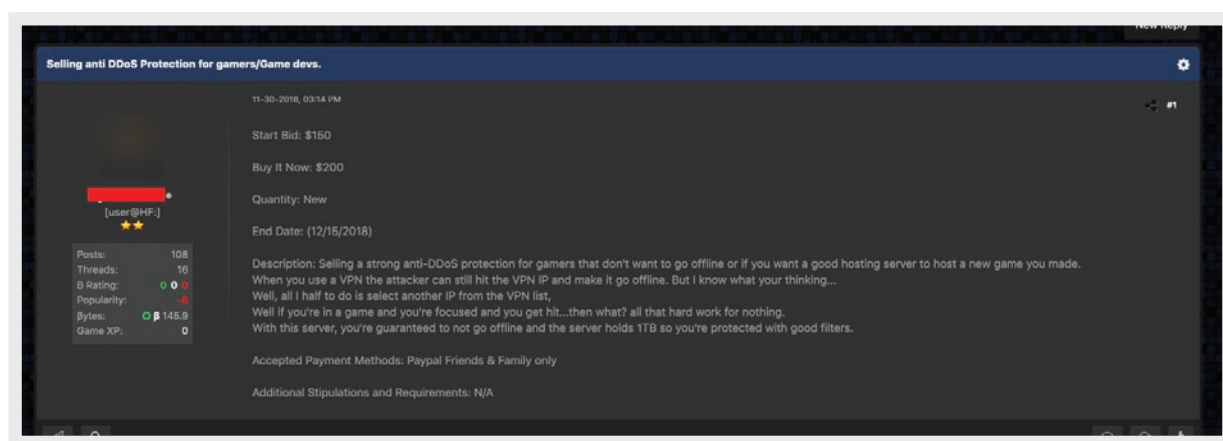


Figure 15. Underground forum post offering an anti-DDoS application for players

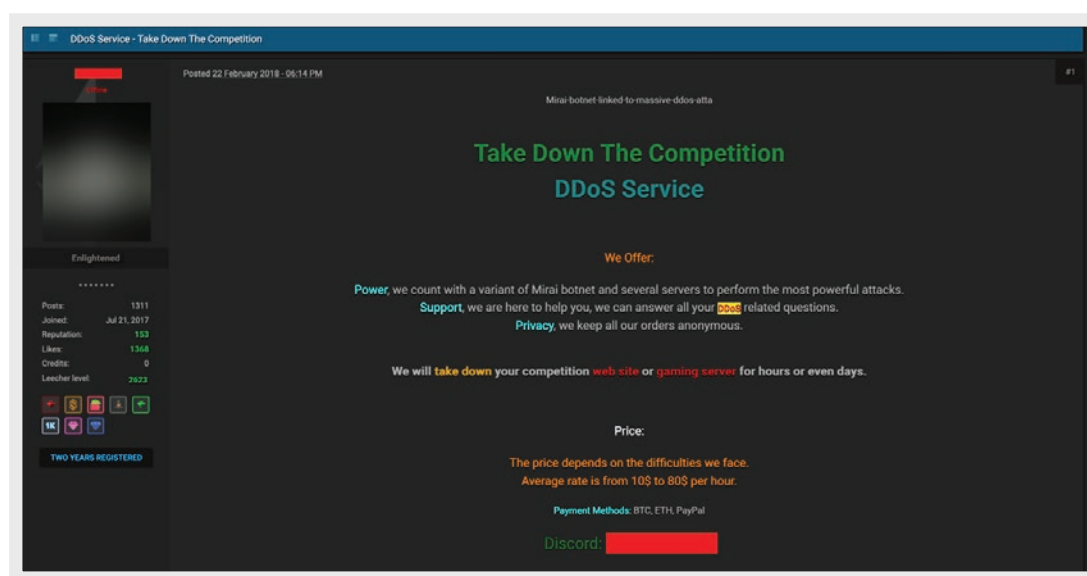


Figure 16. Forum post advertising a DDoS service



Figure 17. Forum user inquiring how to find the IP of a Fortnite server



Figure 18. Forum post of a player asking how to DDoS a gaming server

There have already been several instances of successful DDoS attacks on major esports competitions. In 2015, The International Dota 2 Championships, which had a prize pool of US\$18 million, suffered a DDoS attack during the event's second day. In June 2019, the cybercriminal Austin Thompson was sentenced to 27 months in jail and charged a US\$95,000 fine for launching DDoS attacks against Dota 2 and League of Legends competitions in 2013.²³ Cybercriminals also launch DDoS attacks for extortion.²⁴ In 2017, attackers launched sustained DDoS attacks on the online game Albion, then demanded a ransom to make it stop.²⁵

We predict DDoS attacks will continue to disrupt major tournaments in the near future, as DDoS-for-hire services have become more available and the underground market has an abundance of sellers. We can also assume that cybercriminals will continue to demand a ransom in similar extortion activities.

In general, DDoS attacks can result in serious downtime; according to a DDoS attack report from IDG, 36% of companies that experience more than five DDoS attacks suffer seven to 12 hours of downtime.²⁶ For a gaming platform, even a few minutes of downtime is a serious issue. Esports entities might be compelled to pay the ransom since performance lag will hurt the brand’s reputation, ultimately resulting in financial losses if players become too frustrated and move on to other games.

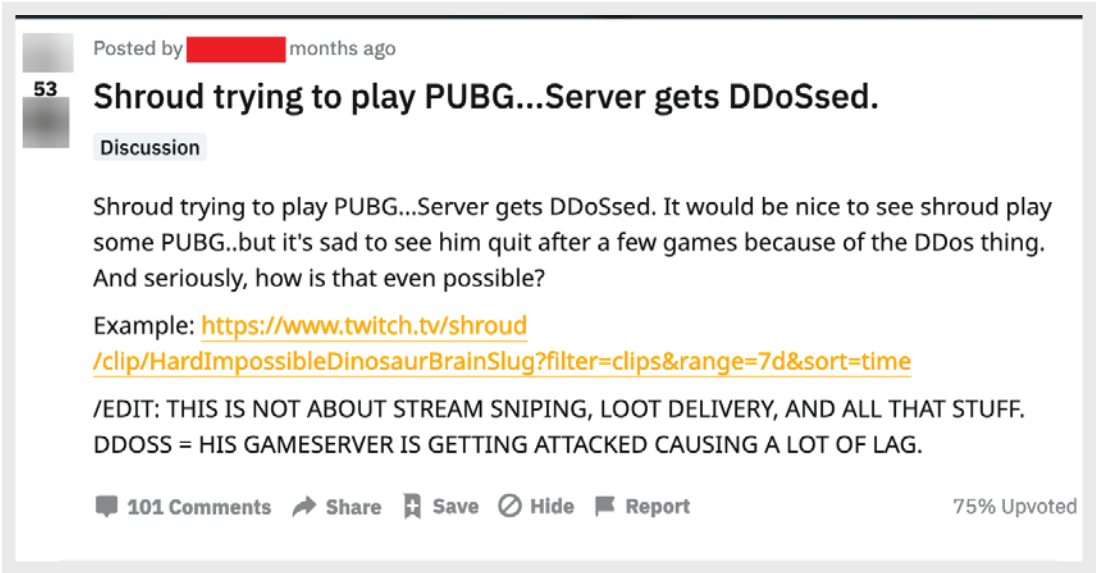


Figure 19. Player complaining about DDoS attacks on Reddit

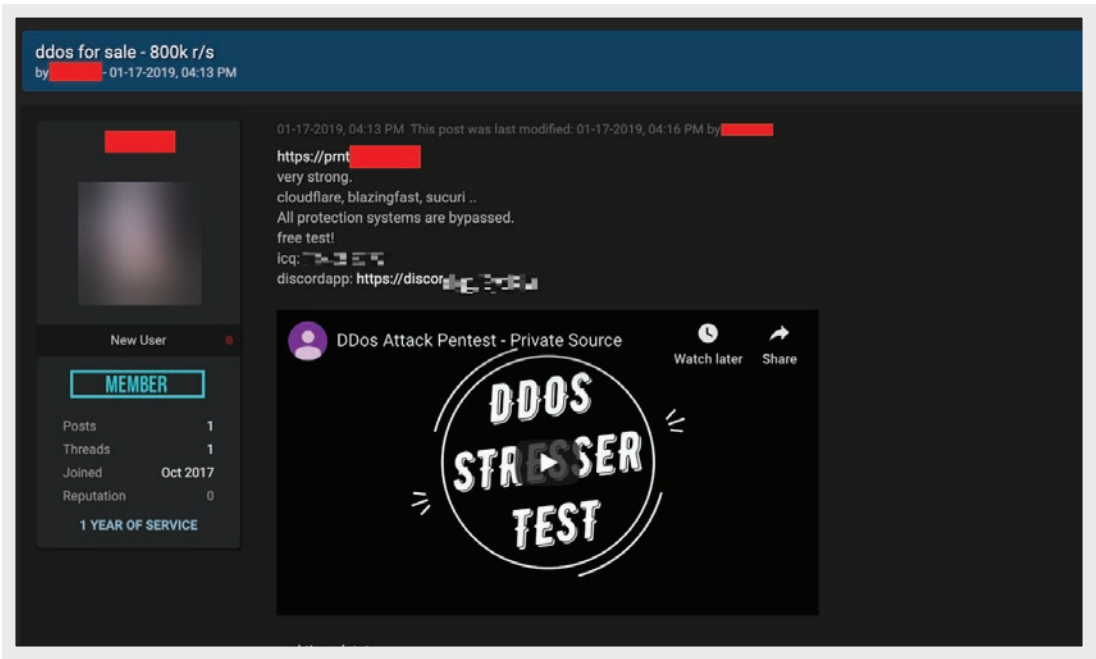


Figure 20. Forum post offering DDoS services

Sponsors should expect to be attacked or have their services go down when sponsoring an esports event. The risk here comes from multiple origins: hacktivists, adversaries, competitors and so on. If they lose money, they'll probably reconsider sponsoring again. It's a general risk for both sponsors and the event organizers, as large scale DDoS attacks continue to be difficult to deal with.

Cybercriminals will start to target game servers

Cybercriminals will look for ways to disrupt daily operations such as live game competitions. These include using exploits and tools to attack any vulnerabilities the game servers may have.

We tried to determine if, and how many, esports gaming assets were accessible through the internet using Shodan, a search engine for internet-connected devices. As of July 25, 2019, we found 219,981 gaming assets that were accessible online. Germany had the highest with 61,272, while the U.S. had 56,500. Steam dedicated servers had 21,930 online assets, while the popular game title Counter-Strike had 12,164.

Searching with Shodan provides an easy one-stop solution to conduct Open-Source Intelligence (OSINT) gathering for different geographic locations, organizations, devices, services, etc. It is not unusual for a server to be accessible in this manner. However, software and firmware information collected by Shodan can potentially help identify unpatched vulnerabilities in accessible cyber assets. Servers are online by nature, and this exposes them to some level of risk. An adversary can use Shodan to perform detailed surveillance and gather intelligence about a target server, and more thorough probing can reveal certain vulnerabilities in the servers.

Here are some of the vulnerabilities found on a few of the game-related servers we scanned:

Vulnerability	Type
CVE-2012-4558 ²⁷	Could allow remote attackers to inject arbitrary web script or HTML via a crafted string
CVE-2013-1896 ²⁸	Could allow remote attackers to cause a denial of service (segmentation fault) via a MERGE request
CVE-2012-3499 ²⁹	Could allow remote attackers to inject arbitrary web script or HTML via vectors involving hostnames and URIs
CVE-2014-0231 ³⁰	Could allow remote attackers to cause a denial of service (process hang) via a request to a CGI script
CVE-2017-7679 ³¹	Could let actor read one byte past the end of a buffer when sending a malicious Content-Type response header.
CVE-2018-1312 ³²	In a cluster of servers using a common Digest authentication configuration, HTTP requests could be replayed across servers by an attacker without detection.
CVE-2010-5107 ³³	Makes it easier for remote attackers to cause a denial of service (connection-slot exhaustion) by periodically making many new TCP connections.

Vulnerability	Type
CVE-2016-0778 ³⁴	Could allow remote servers to cause a denial of service (heap-based buffer overflow) or possibly have unspecified other impact by requesting many forwardings.
CVE-2012-2531 ³⁵	“Password Disclosure Vulnerability” could allow local users to discover credentials by reading Operational log
CVE-2018-10549 ³⁶	Servers with this vulnerability have an out-of-bounds read for crafted JPEG data because exif_iif_add_value mishandles the case of a MakerNote that lacks a final ‘\0’ character.
CVE-2018-10548 ³⁷	Could allow remote LDAP servers to cause a denial of service
CVE-2018-10545 ³⁸	Could allow one user (in a multiuser environment) to obtain sensitive information from the process memory of a second user’s PHP applications.
CVE-2014-1692 ³⁹	Could allow remote attackers to cause a denial of service (memory corruption) or have unspecified other impact via vectors that trigger an error condition.
CVE-2017-15906 ⁴⁰	Could allow attackers to create zero-length files.
CVE-2019-11039 ⁴¹	Could lead to information disclosure or crash.
CVE-2019-11040 ⁴²	Could lead to information disclosure or crash.

The servers scanned include those operated by private gamers and groups, not just those run by the gaming companies.

Targeted malware will be launched to compromise high-profile gamers and brands

Cybercriminals are increasingly deploying targeted ransomware, aiming for a higher success rate of payments from victims. We believe sponsors of esports events should be very careful here as it could expose their brands to certain risks. If a hacktivist or financially-motivated group started looking for targets, sponsors will likely be first in their sights — attackers might assume a known brand’s pockets are deeper than the players’ or the game organizers’.

Undoubtedly, ransomware has plagued gamers and businesses for years. A curious case appeared in 2018 when criminals targeted gamers with ransomware that demanded people play PlayerUnknown’s Battlegrounds in order to unlock their files.⁴³ While the case turned out to be a joke, it was still dangerous.

We are also aware of TeslaCrypt ransomware variants that infected gamers’ computers and searched for file extensions related to various popular game titles (such as Call of Duty, Diablo, League of Legends, Minecraft and Resident Evil) and locked the games’ saved data, player profiles, DLCs, and game mods

stored in the victim’s computer. Victims of the ransomware were instructed to pay US\$500 in bitcoin within one week; the ransom doubles to \$1,000 after the deadline.⁴⁴ As saved games and gaming profiles represent hundreds of hours of gameplay, victims could feel inclined to pay the ransom.

We also expect cybercriminals to compromise famous Twitch and YouTubers gamers’ social media accounts. Cybercriminals will look for accounts that have several million followers and will use targeted phishing attacks and malware to take over these accounts. The cybercriminal underground is already flooded with sales of Twitch and YouTube accounts with a large number of followers. These famous and popular social media accounts not only have a wide reach (imagine if they share a link containing malware for instance) and capillarity, but also represent their brands and sponsors.

We see signs that the cybercriminal underground market for stolen gaming accounts will grow over the next three years. Cybercriminals usually target popular games like Fortnite and Counter-Strike: Global Offensive looking for valid accounts. Stolen accounts are found in abundance in underground forums, with prices starting at just US\$1 per account. Counter-Strike: Global Offensive accounts with The Global Elite rank were found being sold for US\$99. The Global Elite is the game’s highest rank, only reached by less than 1% of the player base as of March 2019.⁴⁵

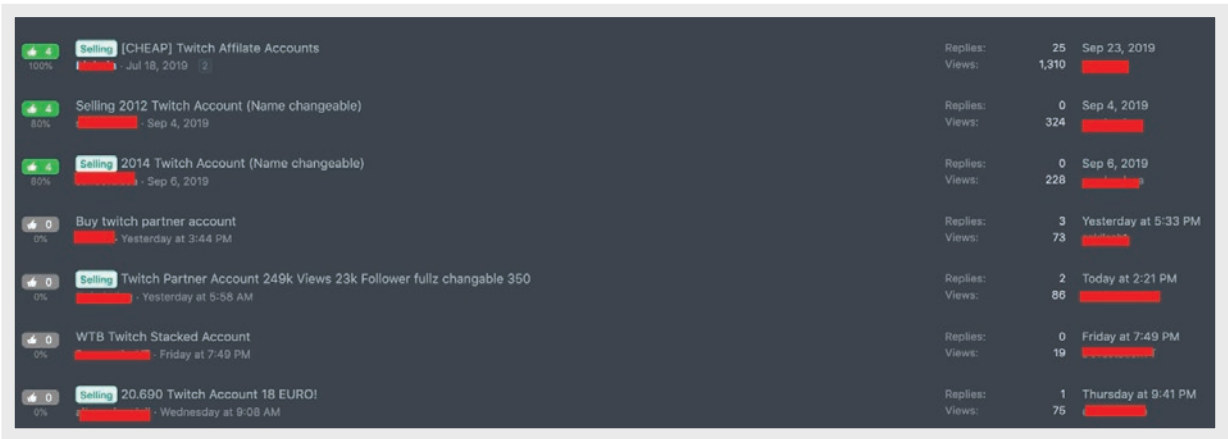


Figure 21. Forum sellers pushing various Twitch accounts

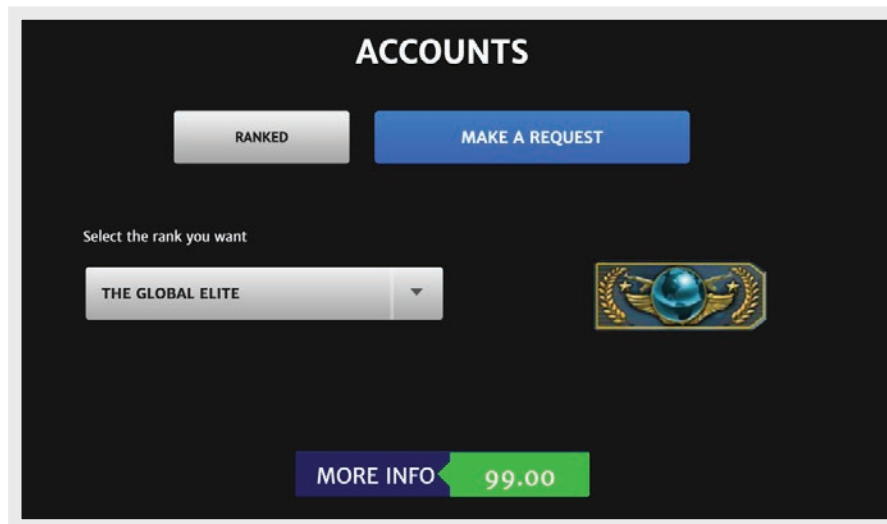


Figure 22. CS:GO accounts with The Global Elite rank sells for \$99

The stolen account market is supported by players using weak passwords; and also weak authentication methods have made it easier to steal these accounts. This is particularly dangerous since they are usually tied to items and digital currencies. Gamers and viewers can lose money when cybercriminals purchase items on these accounts using the original owners' credit card and then make a profit selling these items.

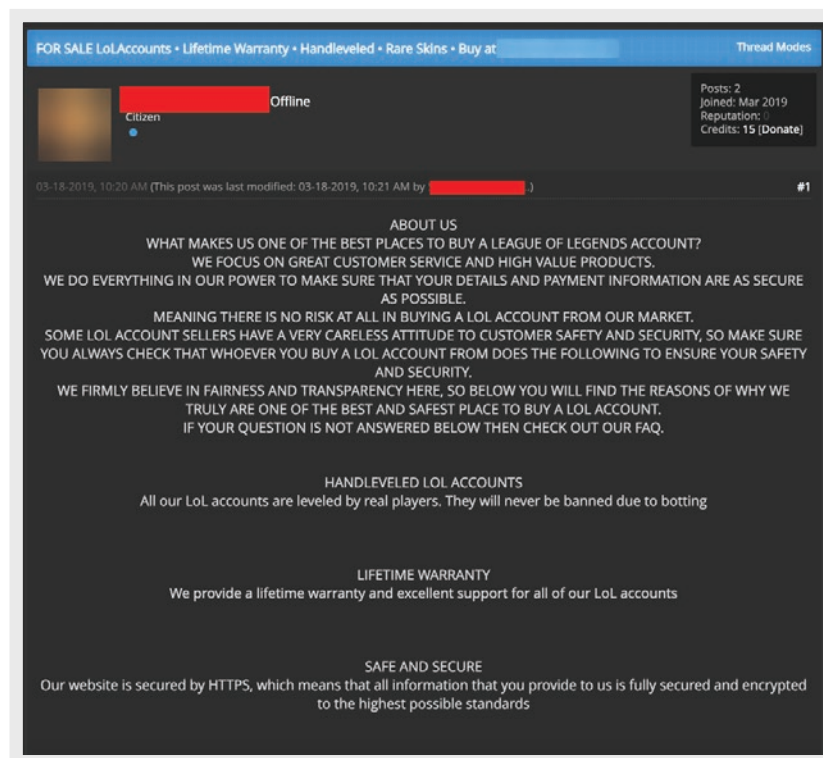


Figure 23. Advertisement selling League of Legends accounts

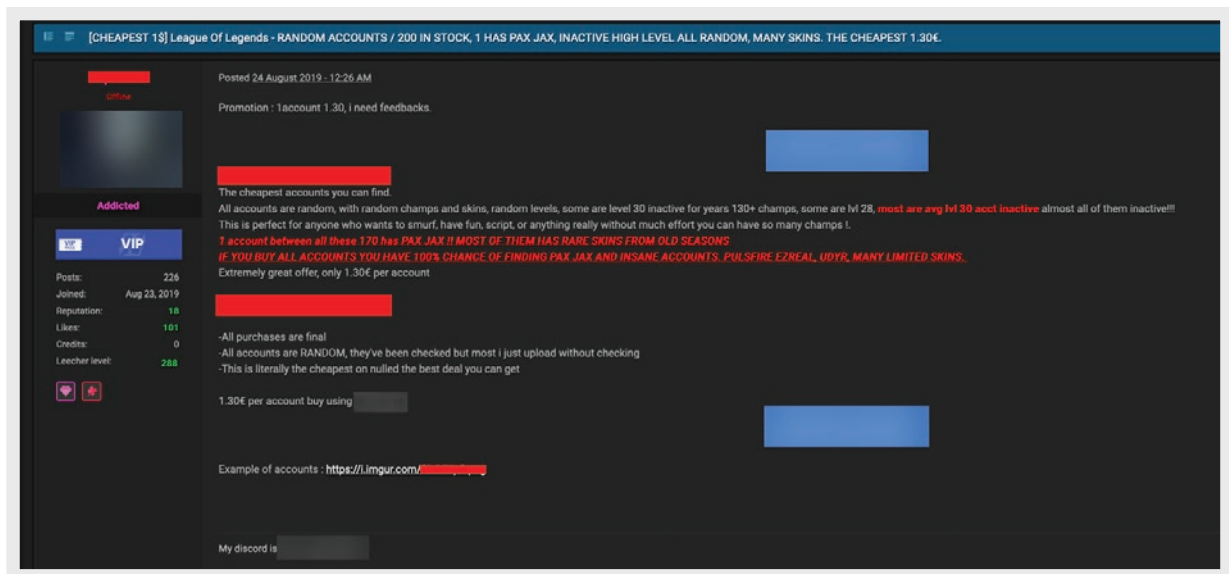


Figure 24. Advertisement selling League of Legends accounts

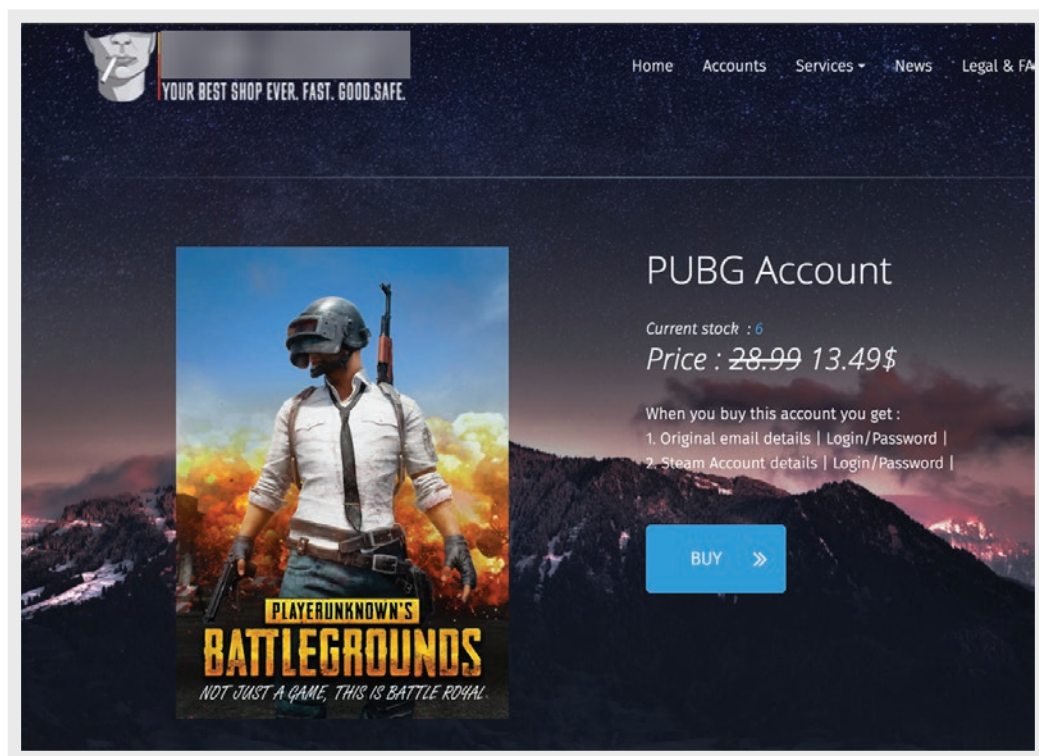


Figure 25. Steam account shop offering PlayerUnknown's Battlegrounds (PUBG) accounts for US\$13.49

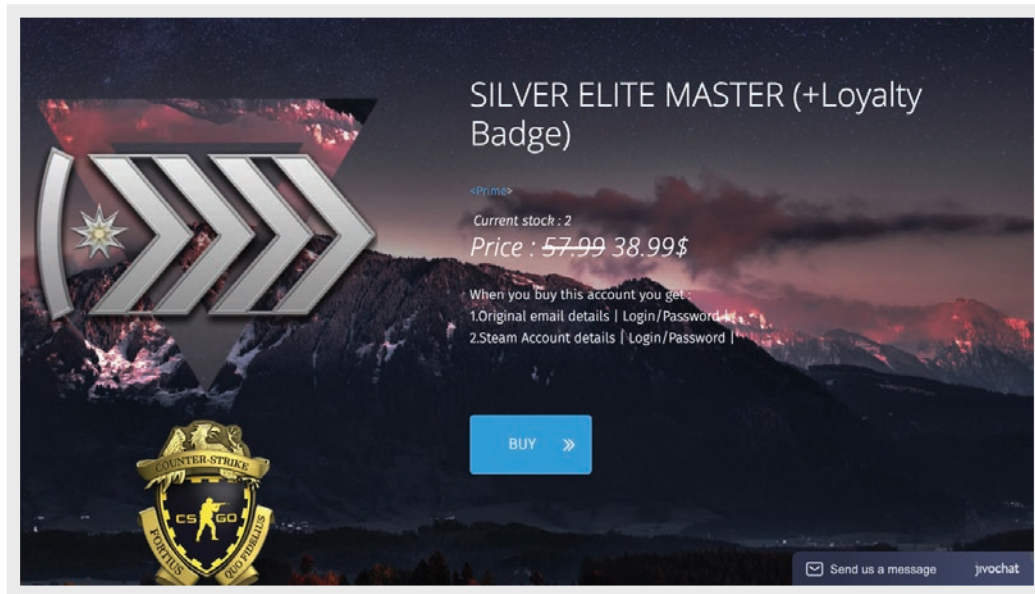


Figure 26. Counter-Strike accounts for sale based on rank

League of Legends Korean Account Shop | Sell LOL LCK ACCOUNT LEVEL 30
by [redacted] - 04-20-2019, 04:09 AM

New User

Posts 1
Threads 1
Joined Apr 2019
Reputation 0

04-20-2019, 04:09 AM

Maybe you are trying to play Korean LOL, but there is no game account available.
Don't worry, we will solve this problem for you!

SAFE AND CUSTOM ACCOUNT

Price: USD \$7.99

- 1 Level + custom login ID + custom password + custom summoner's name (in game name) + custom email address
- This account is a fresh new account, verify your email address, it could be re-activation if got suspended by KR LOL
- Safe account.If you forget your password, you can retrieve it.
- Available to change password and recharge
- Delivery time: within 30 mins (in working hour)
- This is non-refundable
- Able to re-verify (this is important as oversea login could be easily banned from Korean LOL, the account can be re-verify if you got this problem)

VERIFIED ACCOUNT

Price: USD \$6.99 = random + 30 level
Price: USD \$13.99 = 30~50 champions + random + 30 level
Price: USD \$18.99 = 60~80 champions + random + 30 level
Price: USD \$21.99 = 80~100 champions + random + 30 level

- All accounts can be directly use for ranking
- Champions, blue essence, rune pages, skin, ranking are random as well
- Delivery time: within 30 mins (in working hour)
- Not 100% safe
- No any after-sale service for verified account
- Available to change password
- Cannot be recharge
- This is non-refundable
- You should take this if you plan to play Korean LOL for a short time and don't want to waste your time at leveling

We can provide accounts according to individual needs, and the price is very reasonable.
Payment: Paypal, Alipay, Wechat, Point card
Skype: [redacted]
Email: [redacted]@outlook.com

Figure 27. Advertisement selling accounts for the Korean server of League of Legends

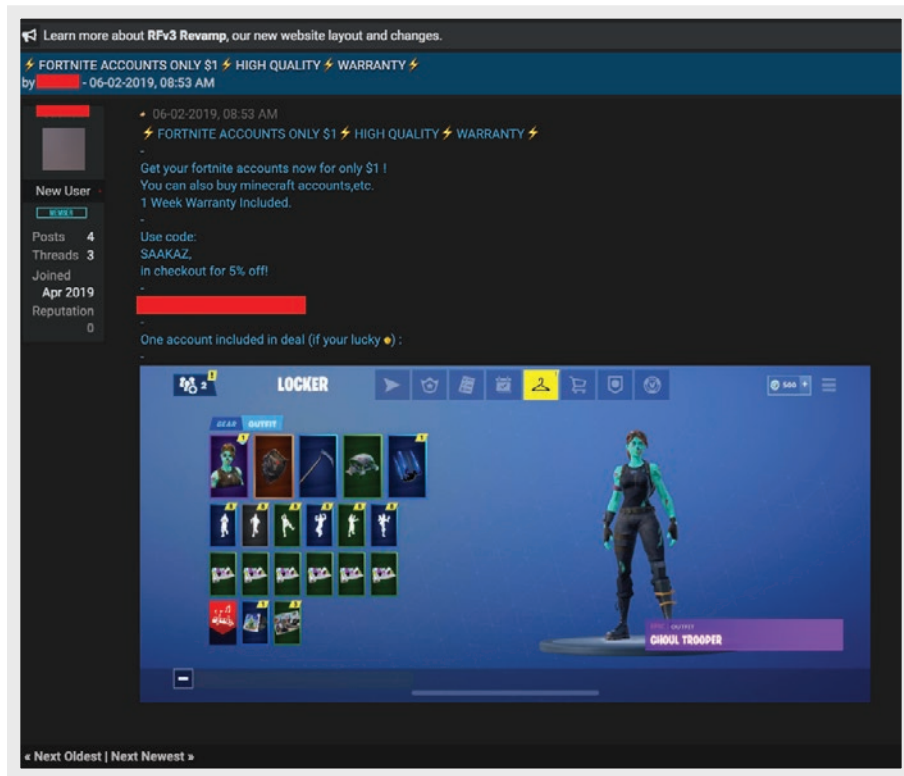


Figure 28. Advertisement selling Fortnite accounts for US\$1

Some gaming platforms have introduced multiple-factor authentication (MFA) to their systems to help protect users from account theft. For example, Valve's Steam Guard system implements two-factor authentication via both e-mail and mobile app. However, we still see hacked accounts for sale in underground forums. This probably means that not all the users have enabled MFA or not all the systems have MFA in place.

Hackers will target players' PII and banking credentials

Data breaches are a threat to esports as cybercriminals look for other targets to harvest personally identifiable information (PII). According to recent findings by Akamai, the tech industry has experienced nearly 55 billion credential stuffing attacks globally, and out of these, 12 billion attacks were directed towards the gaming industry.⁴⁶

In 2016, a malware called Steam Stealer targeted players on Valve's Steam platform via phishing attacks. The malware targeted online gaming items and user account credentials, and we found that the malware was stealing 77,000 accounts per month.⁴⁷ Also in 2016, the eSports Entertainment Association was hacked. The hacker leaked the data of 1.5 million players after the attacker's demand of US\$100,000

was denied.⁴⁸ The stolen information included the username, first and last name, email address, date of birth, zip code and phone numbers of each player. Hackers can also steal players' in-game tokens and weapons, which can be worth a lot of money in the underground market. And there have been a few records on Reddit forums^{49, 50} of players complaining that their accounts have been stolen and sold, or their information was used to purchase in-game items. In August 2019, a scam used a fake "free game" giveaway site to steal the account information of Steam users. It used a fake login page, and even a fake popup that helped it bypass two-factor authentication. The hackers then accessed the account's friend list and sent them phishing messages to gain more victims.⁵¹

Our previous research⁵² revealed a big surplus of PII currently available in the cybercriminal underground. We believe this will increase based on the increasing demand for gaming credentials and similar types of esports data.

Illegal gambling and match-fixing will continue to rise

We expect illegal bookmaking companies to try to tap into the lucrative and still-growing esports market. Traditional organized crime rings and low-level criminals will have an opportunity to influence match outcomes and profit from them in betting markets, and the cybercriminal underground market is flooded with betting and bookmaker services. According to the American Gaming Association, Americans illegally wager more than \$150 billion on traditional sports every year, whether through offshore betting sites or illegal bookmakers.⁵³ Meanwhile, a study from the UK Gaming commission in 2018 reported that 8.5% of British respondents have placed bets on eSport games.⁵⁴

Esports gambling started with Skin gambling — using virtual goods such as in-game items as gambling currency — but it has since moved towards more traditional methods of gambling. In 2018, 81% of gamers in Russia bought virtual goods.⁵⁵ These virtual goods, which mostly consist of cosmetic items that modify the player's in-game appearance (or "skins"), have an intrinsic value to the players, but in popular gaming titles they are actually sold and traded for cash too.

A string of match-fixing scandals have already occurred in major esports events, affecting Counter-Strike, League of Legends, Dota 2, and Overwatch tournaments. A Dota 2 professional player known as Bryan Freddy "SmAsH" Machaca Siña from Peru was banned from Valve-endorsed competitions after it was concluded that his team intentionally lost in 2016.⁵⁶

If a team is playing poorly, a surge of bets might be placed on the opposing team. Suspensions arise when those mistakes are preceded by high stakes wagers.

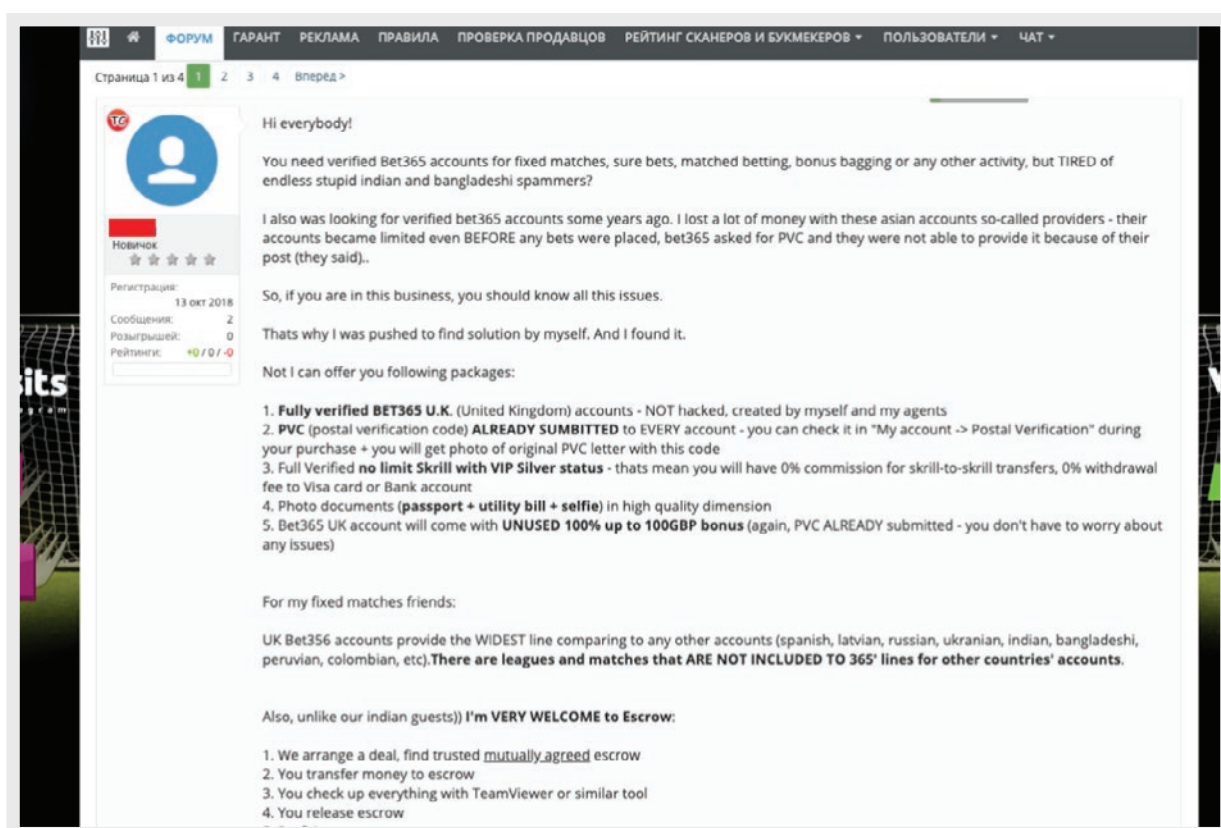
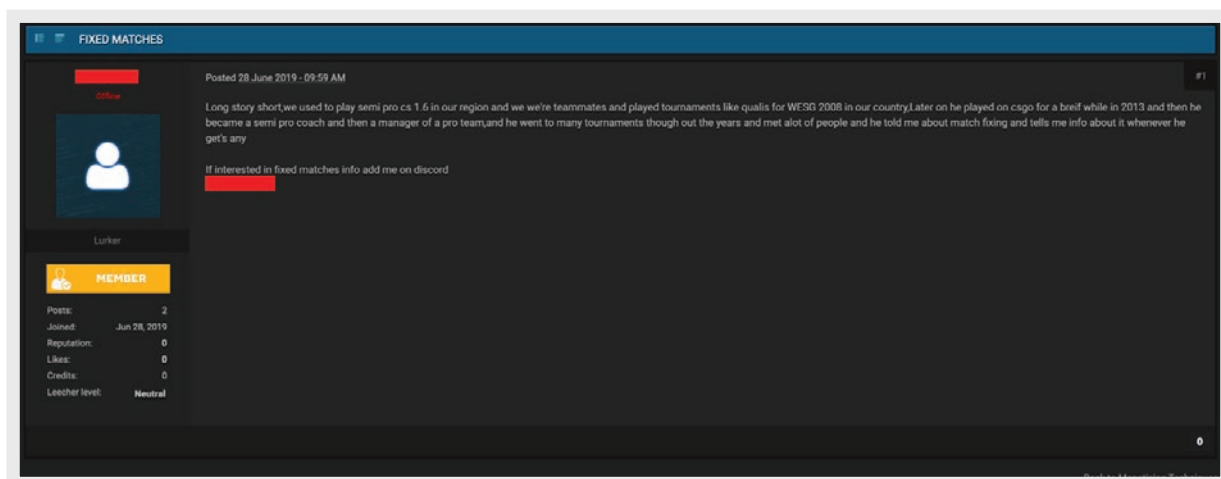


Figure 29. Forum posts offering a match-fixing service

Match-fixing is a common issue for traditional sports, and we believe that it will become a challenge for esports too. Match-fixing is actually illegal in South Korea and the U.S., and players can be banned or disqualified for match fixing. The term “322,” shorthand for match-fixing, is now common in the esports vocabulary. The term was coined after a player bet US\$322 against his own team during a Dota 2 competition in 2013. In 2019, League of Legends player Condi was banned from competitive League of Legends games after violating match-fixing and gambling rules.⁵⁷

Politically motivated and targeted attacks will increase

We expect to see nation state actors attempting to influence politics in esports and cause identity theft, financial loss, and reputation damage to businesses and players.

Advanced persistent threat (APT) groups have already taken advantage of the gaming industry. A good example is the financially motivated APT41, which has been targeting gaming platforms with ransomware since 2012.⁵⁸ The group is still active and has evolved to espionage campaigns.⁵⁹ Another organization called the Winnti group targeted three Asian gaming companies with a backdoor trojan.⁶⁰ This could happen to esports companies as well.

Also consider the 2018 Winter Olympics opening ceremony, where cybercriminals actually brought the Wi-Fi service down.⁶¹ Attendees were unable to print their tickets; internet services were down; and TV media was offline. Months before the Olympics started, APT28 (Pawn Storm) actors deployed coordinated attacks: they released fake news reports and compromised email accounts of the International Olympic Committee, allegedly in retaliation for Russia's doping suspension.⁶² Two years before, the same group published stolen medical data belonging to mostly British and American athletes from the Summer Olympics Games in Rio de Janeiro.⁶³ If esports became an Olympic event or was included in other international games, we could see cybercriminals attacking the event in a similar way.

We predict that companies involved with esports will be open to certain risks if the games ever become an Olympic sport — and we believe they are already on the way. In 2018, esports was incorporated as a demonstration sport in the Jakarta Palembang 2018 Asia Games, which included titles such as League of Legends, Hearthstone, StarCraft II, Clash Royale and Arena of Valor. Esports was initially announced as a medal event in the 2022 Hangzhou Asia Games, but it has not been officially added to the program as of September 2019.⁶⁴ The Asian Games, which is governed by the Olympic Council of Asia, is the world's second-largest multi-sport event after the Olympics. The International Olympic Committee (IOC) has also been in talks with international committees on the future of esports in an Olympic event. As of now, IOC is still exploring this topic and has not made any official statements but the interest shown is noteworthy in itself.

Conclusion

We have no doubts that cybercriminals will heavily target the esports industry starting this year. Most importantly, through analysis of the esports market and the technology behind it, we strongly believe that it will face the same types of cyberattacks that the gaming community is already facing — but on a larger scale. Also, with esports predicted to join the Olympics in the future, new challenges lie ahead — matches among nations might inspire nation-sponsored hackers to rig games for pride and bragging rights.

These threats should also concern the parties and organizations (such as game developers, event organizers, and sponsors) with ties to the esports industry. They have to be careful as such exposure may lead to financially or politically motivated attacks. Both brand reputation and company earnings are at risk here.

Finally, the players have to pay more attention to their online security and demand more security from the platforms (such as game servers and social media) that store or access their profiles, since any compromise could put money and credibility at risk.

It should be said that our message is not that the esports industry is unsafe. The gaming companies and organizers are well aware of their status as targets, and they are always on the lookout for new cheating techniques and tools. They are constantly adding new security features to their processes and infrastructure. There are also different anti-cheat services that are specifically geared towards protecting esports and gaming competitions.^{65, 66} This research effort was done to raise awareness about the risks we predict evolving in the near future.

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