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Handbook for Esports Broadcasting

Bachelor of Business Administration

Esports Business

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Abstract

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This thesis has its roots deep in the willingness to create a guide for esports broadcasting and stream production. With live streaming grown more popular, the job opportunities it poses have skyrocketed. As such, creating a handbook for all those interested in this field of work was a sensible idea to start working on and it was unclear, as to why there were no such books written prior to this. The purpose of this thesis was to produce a handbook to provide a single source of all the necessary information on broadcasting to make the way towards professionalism easier. The need for a book such as this one comes from the lack of a single source of information for all the technical and difficult-to-find material.

The thesis was project-based, with the output being a handbook, a written guide to help pave the way towards professional esports broadcasting. The thesis had no commissioning party, but the goal was to produce a solid-enough piece of writing to be published as an individual work separate from this thesis. This would make the book more accessible to the people interested and offers the opportunity for institutions to utilize the book for teaching purposes, should there be a need for that. The book writing process was carefully planned out to help keep track on the topics discussed.

From the start, the plan was to write a book about broadcasting, but the result turned out to be a book that a much broader audience can benefit from. With the addition of standard stream production topics, the book ensures that there is much to learn for even those only interested in streaming. Since the fundamentals are so similar in broadcasting and streaming, this was a sensible adjustment to make. The quality of the output was a book that offers a large amount of information in a way that is easily consumable, thus ensuring the learning capabilities of the book. The publishing options will be discussed after the thesis has been accepted, but it is likely that the thesis and the book will both be published in Theseus for students from all around the world to benefit.

Foreword

It is a big sigh of relief to be able to bring this thesis to a close. Though the topic was interesting, and helped with the writing, it is safe to say that neither of us could get through the writing process by ourselves.

We want to express our gratitude towards our fellow colleagues from our project “Andice Productions”. Thanks to Heikki, Taneli and Janne for our shared experiences, without which this thesis would have not been possible to write. We also thank everyone who made it possible for us to gain such experiences. Last but not least, we thank our teachers Janus Pitkänen and Jani Vattula for the help and guidance along the way.

We hope that anyone reading this thesis finds the information useful and helpful on their path in the world of broadcast production and stream producing. In addition, we hope this thesis sparks an idea on someone, to write about the matters we did not discuss in this work.

Roope Kalanti & Kimi Seppänen

Table of Contents

List of Abbreviations (In the order of appearance)

SEUL = Finnish Esports Federation (Suomen Elektronisen Urheilun Liitto)

FPS = First-Person Shooter

MOBA = Multiplayer Online Battle Arena

RTS = Real-Time Simulation

CS2 = Counter-Strike 2

R6 = Tom Clancy's Rainbow Six: Siege

NHL = National Hockey League

EA = Electronic Arts

EAFC = EA Sports FC

OBS Studio = Open Broadcaster Software

CPU = Central Processing Unit

GPU = Graphics Processing Unit

UI = User Interface

FPS = Frames Per Second

POV = Point of view

NDI = Network Device Interface

1 Introduction

With the industry of esports growing steadily towards the top of the whole entertainment industry, distribution and broadcasting helps pave the way for different titles and thus helps with creating the consumer contact. Especially broadcasting lifts its head, when it comes to future possible employers in the tough-to-employ esports industry. Also, live streaming is becoming more and more relevant for many of the most popular social media platforms, creating countless opportunities for anyone to gain recognition doing what they love.

This thesis aims to tackle the aforementioned opportunities in form of a handbook. The handbook offers a helping hand to all the aspiring streamers, to help in the beginning of their journey. Another target group to benefit from this work is the future broadcasting professionals, as the latter half of the book focuses more on the advanced side of stream production and broadcasting.

1.1 Background

In the esports industry, broadcasting plays the same role it plays in traditional sports, offering entertainment to consumers. According to a blog post from Champlain College, broadcasting has helped to get the public excited about different esports events ("Esports Broadcast Jobs," 2024). This also implies that broadcasting plays a crucial role in connecting the audience with the esports athletes and organizations, creating more monetizing options and a platform for potential third-party partnerships. As stated in a *demandsage.com* blog post by Naveen Kumar: *"The global esports audience is expected to exceed 640.8 million in 2025"* (Kumar, 2025).

Though esports as a field is finding its foothold in the entertainment industry, the standards and the ways of working are still yet to be determined. This is true especially in the broadcasting side of esports, therefore the development of a handbook is essential to provide guidance and structure, and to help the future upcoming professionals with their journey. Broadcasts in the field of esports are a minor player compared to traditional sports. As a new industry, there are way less broadcasts seen on television or radio. In Finland there have been some esports tournaments that were broadcast in the national television. Esports broadcasts have a lot more potential for different ways of advertising, because of the more sophisticated technologies available. The

adaptability of the technologies used gives way more possibilities for new and innovative product placements (Kareinen *et al*., 2019).

1.1.1 Professional background

Both authors of this thesis have previously worked in the esports broadcasting industry. Some of the topics discussed in this thesis come from this aforementioned experience and is backed up with a theoretical framework, consisting of both academic and non-academic sourcing.

The work in this thesis is guided by the following question: How to ease the path towards professional esports broadcasting? This question arose from the broadcasting experience shared between the two authors. Especially in the early stages of grasping the world of broadcasting, all the technical information can be overbearing. This thesis aims to aid that exact part of the journey, while still offering help to even the more experienced ones. Collecting all essential information to one place and backing it up with guiding imagery, paves way for the future upcoming professionals.

This thesis has no commissioning party, for the motivation to write such a handbook comes from previous work experience in the given field. The purpose of this is as stated above in the form of a question: How to help people in their way towards a profession in the broadcasting world? All the information gained through experience combined with information from various sources aim to bring together everything necessary to ‘make it’ in the niche field of esports broadcasting.

1.2 Limitations

The output of this thesis is a handbook, to which material has been gathered meticulously from a wide range of sources, yet the limitations set for this work are quite clear. The handbook is written for Windows-run PCs, and as such, we do not consider the effectivity of the handbook for other operating systems, such as MacOS or Linux. Most of the functionalities discussed work the same way on other operating systems, but to clarify the usage of this handbook is intended to help those operating with Windows 10 or 11.

As the gaming and esports industry is quite a large subject, involving thousands and thousands of games, we have limited this handbook for only the ones we have deemed most crucial. To select

the games discussed in this work we used information from various sources, with the addition of our own work experience in the field, to scope out the most relevant game titles to be discussed. The relevancy of the selected games in their genre was also taken into consideration when making the selection.

2 Theoretical Framework

In the side of traditional sports, broadcasting plays a major part in the distribution of the sports content. Traditional sports like ice hockey and football have built a professional infrastructure and principles around the different parts of broadcasting. The Esports industry uses a lot of those same principles in the broadcasts, with the addition of some key aspects that are only seen in esports games. Being a fairly new industry and a niche field, there is not much research done with the academic setting in mind. Due to being a new and developing industry, a lot of theories and inspirations are taken from the side of broadcasting in traditional sports. This being said, the main focus on all the areas discussed will be from the perspective of esports, and therefore the sources focusing on esports will be highly utilized.

To answer the research question posed in this thesis, it is essential to develop a comprehensive understanding of the topic. This understanding is achieved by examining relevant theories, concepts and prior studies. The theoretical framework of this thesis is constructed using information gathered from various academic and non-academic sources. By bringing together insights from these materials, this framework lays the foundation for exploring the question posed in a well-supported way.

2.1 Definition of concepts and terms

This section explains important terms used in this thesis. Concepts discussed below are considered by their relevancy in the following handbook. The relevancy of the games mentioned, come from the experience and from the research of the most popular titles in their genre. Defining these terms helps avoid confusion and ensures better understanding of their meaning in the right context. Comparing esports to the side of traditional sports helps understand its impact on the entertainment industry.

2.2 Esports

"What is eSports and why do people watch it?" describes esports as follows: "*eSports is as a form of sports where the primary aspects of the sport are facilitated by electronic systems; the input of*

players and teams as well as the output of the eSports system are mediated by human-computer interfaces." (Hamari & Sjöblom, 2017). Esports usually refers to competitive gaming which can be professional or amateur level. It's also coordinated by different organizations which can have different esports leagues or tournaments. Players at pro level are also part of teams or organizations that pay them salary (Hamari & Sjöblom, 2017). Esports is divided into different genres of games like FPS (first person shooter), MOBA (Multiplayer Online Battle Arena), RTS (Real-Time Strategy) and sports games ("Mitä on e-urheilu?," 2024).

2.2.1 First-Person Shooter (FPS)

In first-person shooter games the game picture is shown from the point of view from the characters' eyes. The main idea of FPS games is eliminating enemies. Player POV can show different kinds of information, like the players' hit points, ammo of the current gun and armor. FPS games have different game modes that are used in esports.

The most common game mode in these games is Defuse/Search & Destroy. The main idea of the game mode is that one team is defending a site or area, and the attacking team is trying to destroy the area. Both teams can also win the round by eliminating all the players from the enemy team (SEUL, 2024). Currently the biggest FPS-games by viewer hours are VALORANT, Counter-Strike 2 (CS2) and Tom Clancy's Rainbow Six: Siege (R6) ("FPS Games Leaderboards," *2025*).

2.2.2 Counter-Strike 2

Counter-Strike 2 is one of the most popular FPS games in the world. CS2 is produced by Valve Corporation, and it is a sequel to Counter-Strike Global Offensive (CSGO). CS2 has a well-established competitive scene. The tier 1 tournament calendar is full, and it has many tournaments from different organizers like PGL, ESL and BLAST. The biggest tournaments are called Valve Major Championships, commonly called Majors. Majors are unique, because they are hosted by multiple different tournament organizers that Valve choose. Major is also considered to be the pinnacle of the game (Mclaughlin, 2024).

2.2.3 Sports games

Sports games can be defined as video games that are based on a real-life sport. The goal of the game is usually the same as in the real-life variant of sport, e.g. scoring a goal in football. In sports games the game is played in one versus one, where the player is controlling all their teams' characters. Some tournaments can also be played as two versus two game mode. In NHL they also play six versus six tournaments. The most popular sports games are Electronic Art's (EA) NHL and EA Sports FC (EAFC) series. Typically, these games release a new version every year ("Urheilupelit," 2024).

2.2.4 EAFC series

EA Sports FC (EAFC) is a football sports game. The game is played like regular football, but only through console or PC. The new EAFC game is released annually by the developer Electronic Arts. Currently the version that is played in esports is EAFC25. EAFC has many collaborations with different national football leagues like Premier League, Bundesliga and Ligue 1. These are called FC Pro Leagues and in them there is an esports player representing a team from the original league. There are also the annual FC Pro World Championships (Mistry, 2023).

2.3 Esports in the entertainment industry

Esports streams are mostly consumed from various streaming platforms, such as Twitch, YouTube and Kick. The viewership for game related content on the aforementioned platforms consists largely of men in the age group of 20-40. (Revankar, 2025) This implies that the esports broadcasting industry competes from the same audiences with the traditional sports networks. In 2021 the viewership of esports media in North America was the second most consumed form of sports media, left behind only by the NFL ("The Rise & Rise of Esports," 2023). Esports broadcasting has a competitive advantage on traditional sports with the factor that consuming esports live streams is completely free of charge, whereas most sports networks charge their viewers with either a subscription or pay-per-view model. There is a rather self-explanatory downside to free viewing, which is the difficulty of monetization and profitability.

2.3.1 Most streamed esports titles

For the past years, MOBA games have dominated the charts of most watched esports tournaments. The MOBA genre has formed from RTS genre to be its own, having the same principles for player managing their character and resources in-game, but adding the factor of team play via internet connection. MOBA games are popular in population-dense countries, which include China, Japan, Vietnam and South Korea, which is also deemed to be the homeland of modern esports (Torres-Toukoumidis, 2022, pp. 6-7). This directly results as higher viewer counts on streams, causing a noticeable gap to Counter-Strike, that is more popular in the western hemisphere.

Table 1.1 Most watched e-sport competences in 2021

No.	*Competence*	*Game*	*Views*	*Broadcasted hours*
1	League of Legends Worlds Championship 2021	League of Legends	174,820.000	134
2	Dota 2: The International 10	DOTA2	107,230.000	125
3	Mobile Legends: MPL ID Temporada 8	League of Legends	76,940.000	172
4	Counter-Strike: Stockholm PGL Major	Counter-Strike: Global Offensive	71,260.000	120
5	League of Legends: Spring LCK Split	League of Legends	67,640.000	290
6	Mobile Legends: Worldwide championship M3	League of Legends	62,610.000	103
7	League of Legends: MSI 2021	League of Legends	61,180.000	86
8	League of Legends: Summer LCK	League of Legends	60,520.000	295
9	Mobile Legends: MPL ID 7 Season	League of Legends	54,290.000	169
10	Valorant Champions 2021	Valorant	46,040.000	98

Source: Based on Borisov (2021)

Table 1, Most watched e-sport competences in 2021. Note. Table incorrectly shows that competences 3, 6 and 9 played League of Legends. The correct game in these competences was Mobile Legends: Bang Bang.

Mobile esports titles are popular in Asia, because the established esports titles are more inaccessible. Former competitive PUBG Mobile player MD Ekramuzzaman said, “If you talk about Bangladesh or any South Asian country, proper esports is not a thing for us, because building a PC costs a lot of money from the perspective of a South Asian family.” (Lee & Joseph, 2021). Part of the popularity of mobile games is also explained by Covid-19 pandemic. During the pandemic there was 12% increase in mobile-game player bases between years of 2019 and 2020 (Lee & Joseph, 2021).

2.4 Broadcasting in esports

Streaming video game content directly to consumers with the possibility of interacting with the streamer in real time, blends both the gratification gained from playing video games, and the joy of watching traditional forms of media, like cable television (Hamari & Sjöblom, 2016). Watching others play interesting video games offers a lower barrier to entry for people outside the gaming community, since the viewers do not have to know how to play the game to still be able to enjoy the content it offers.

On the other hand, broadcasting large-scale esports tournaments offers similar sensations for viewers as traditional sports. Watching high-performance esports athletes compete at the highest level offers game enthusiasts a chance to feel a sense of uniformity together with other fans of the same teams, or game titles (Hamari & Sjöblom, 2017). On the highest level of competition, it is not only the players that have the possibility to gain a fanbase, as the broad-cast talent often has similar opportunities as the players do, with growing audiences. Along with a large viewership comes various monetizing possibilities for the broadcasting companies, tournament organizers, on-air talent, and the players competing in the top-tier tournaments.

Broadcasting in sports means making the game available for a broader audience through both internet platforms and traditional TVs. In the esports industry the reliance on broadcasting is relatively larger, since exposure is what sponsors pay the teams for, and the money brought in by sponsors plays a significant role in the whole economy of esports. This is well explained in Figure 1.

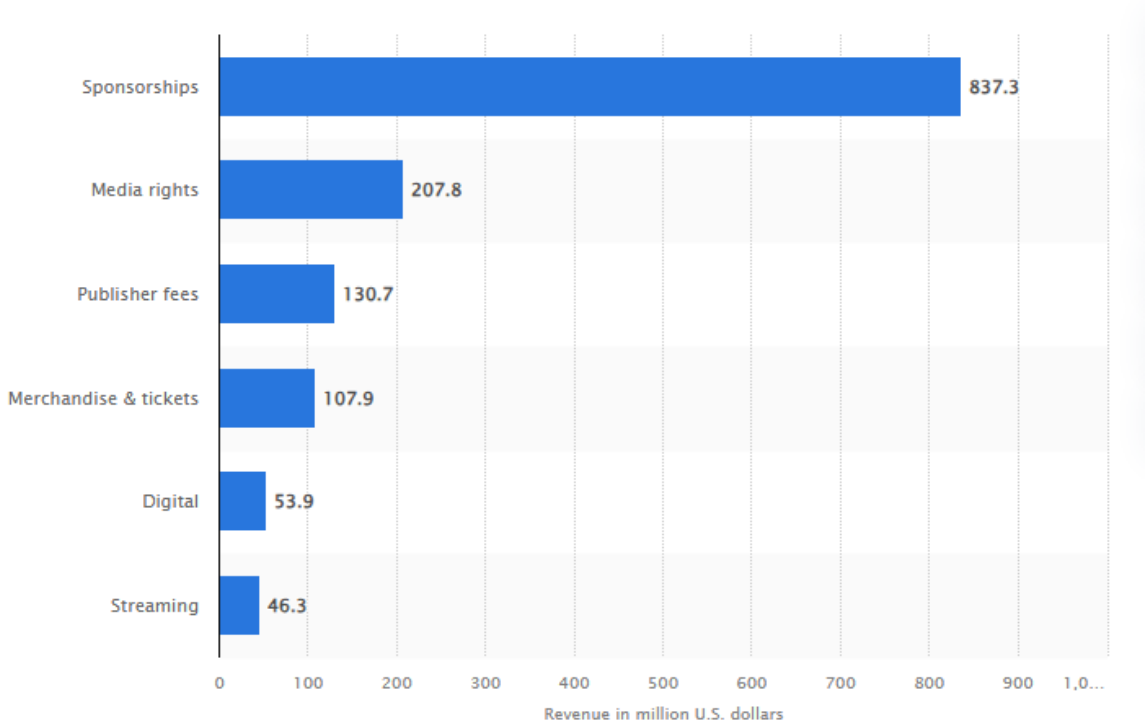

Figure 1, eSports market revenue worldwide in 2022, by segment (Statista, 2025).

2.4.1 Streaming software

TechRadar defines streaming software as a tool that allows users to capture and broadcast live or recorded content over the internet. These applications are essential for content creators, providing features such as video and audio mixing, real-time editing, and integration with streaming platforms. The article emphasizes that choosing the right streaming software depends on the user's needs, whether for gaming, professional broadcasting, or general content creation. Key factors to consider include ease of use, performance, and platform compatibility. (Baxter & Clark, 2025)

The handbook focuses mainly on two streaming software, Open-Source Broadcaster (OBS) Studio and Streamlabs Desktop. Streamlabs is out of the two by far the more user-friendly program, but it also takes up much more computing power from the PC. This might cause issues with PCs running on older hardware. OBS Studio on the other hand is versatile, yet light on system requirements. The user interface of OBS Studio is slightly more complicated as Streamlabs' one, but these will be discussed further in the book.

vMix is a streaming software used by all the professional broadcasting companies. Due to lack of resources, and experience with the program, this thesis will not discuss vMix but instead focuses on the more accessible software. As a software vMix operates on the same principles as the two software programs discussed in this thesis, with the addition of more complex features, that require much more computing power and are meant for professional level broadcasting.

2.4.2 Encoding

Encoding is the process in which the video and audio of a live stream is compressed for sending it online, so that viewers can enjoy the stream on their selected device. As a part of the process of streaming, encoding can be overlooked due to its' complicity, but in fact it plays a major role in producing a quality live stream. (Restream, 2025)

The result of encoding can be achieved through both software and hardware encoders. Since the handbook focuses on paving the way for future professionals, software encoders are mostly discussed in it. This is due to the high cost of hardware encoders, and the functional limitations they bring to the table. Hardware encoding offers high performance, low latency, and reliability but is expensive and less flexible, while software encoding is more affordable, customizable, and versatile but depends on the computer's power and may have higher latency (Restream, 2025).

The importance of encoding in live streams is stated on *Cloudfare.com* as follows:

"Video encoding is necessary for two main reasons:

1. *Uncompressed video files take far too long to send over the Internet for streaming to be practical.*

2. *Video has to be in a format that any user device – smartphones, laptops, PCs, etc. – can interpret."* ("What Is Live Stream Encoding?," *n.d.*)

Commonly streaming software such as Open Broadcaster Software (OBS Studio) offers a variety of different encoders to choose from. However, as mentioned earlier this option is often overlooked due to lack of information, and the ready-to-go presets offered within the software.

3 Focus of Development and Defining the Limits

This thesis focuses on the output, that is a guide for streaming and broadcasting enthusiasts, as well as future esports professionals. The work will consist of gathering all the essential information and combining it with work experience. As the guiding question for this handbook is as stated above “How to ease the path towards professional esports broadcasting?” it is vital that the information gathered is relevant and in a format that is easily understood.

Our main objectives in this thesis could be stated as gathering the essential information and making the output as plain and simple as possible, so that readers with different backgrounds in the given field will both understand what the handbook is talking about and get some value out of reading it. As a first measure for these objectives acts our own perception and feeling about work. Secondly the possible feedback from our readers.

The theoretical framework ties together with the output of this thesis on various levels. Most of the concepts defined in the theoretical framework will be frequently used and referred to in the handbook itself. Despite having established somewhat of a framework for our thesis, there will likely be additional concepts added into the theory part later on, as the work progresses. The concepts explained were decided due to their relevancy, and the expected frequency of use in the handbook.

4 Handbook for Esports Broadcasting

This handbook was created to help all those interested in starting their own streaming career. Whether you aim to become a professional, or if it is just something you like to do, the book will help you with the first steps on your chosen path. We aim to be able to bring something to the table for everyone interested in the field of streaming/broadcasting, from a beginner to a seasoned veteran. This being said, the focus point of this book is on the beginner side of things, as those only at the start of their journey are the ones that need the most guidance.

4.1 First steps

One of the most defining decisions made before starting one's streaming career is to decide which game they want to stream, and in which format. The reason for this is mainly the varying requirements for hardware, which directly affects the cost of used equipment. For example, streaming games without a camera, using just the PC and the microphone included in your headset, requires no additional investment in streaming. On the other hand, from our own experience additional peripherals, such as a camera, add value to the viewing experience, as people are generally more interested in seeing the person playing the game in real time. This also may help with building relationships with the viewers, as the streamer might seem more approachable when you can see their face.

Another format for streaming is to create a studio broadcast for competitive games, which will be discussed more on the advanced part of this book. This format means that the one streaming will not play the game themselves but rather watches and commentates on others playing. Though being a much more advanced format, studio broadcasts can essentially be created with the same hardware used in the aforementioned method of the streamers playing themselves playing games.

There are multiple other formats and different kinds of streams made, but since this book focuses on esports broadcasting, we will be focusing on game-related streaming content, rather than going through all different kinds of streaming.

4.2 Hardware

The amount and quality of peripherals you need to acquire for your streaming career entirely bases on your aims and what you want to achieve. As discussed in the previous part of this book, there are multiple formats of streaming that all require different specifics. For example, at the bare minimum streaming requires no significant investment, other than the PC or console, that you would already have invested in. A tiny upgrade to this is to add a camera for the viewing experience. Good quality peripherals can often be found through second-hand stores, since buying high quality utilities cheaper brings much more value to the table than buying the cheapest gear you can find.

4.2.1 Building your setup

Building your streaming setup can be an overwhelming task when you are starting your streaming career. The goal you want to achieve from streaming defines what kind of setup you should build for yourself. The game you want to stream effects on how you should build the setup. For example, if you want to stream from console, you don't need any extra equipment to start your stream. Many streamers start their career with bare minimum and upgrade their setup as they get more followers. Building the setup might get expensive so upgrading as you go is usually the best option. This section will go through three different levels of streaming setups. The aim is to explain how upgrading certain things in setup improves the quality of stream.

Example Setup 1

As the first of three examples, this setup has close to the minimum requirement mentioned above, with the addition of a camera. This setup is relatively simple to assemble and will provide the viewers with a pleasant quality stream.

Figure 2, Pc, peripherals (mouse, keyboard), headset/microphone and camera

Example Setup 2

The second example setup is what we thought an “average” streaming setup could look like, for those that stream regularly. This setup has all the essential peripherals for a streamlined and professional looking live stream. This setup utilizes an external audio interface, which in turn improves the audio quality to a professional level, since an external audio interface allows the usage of XLR microphones. The stream deck is used for controlling what is happening in the stream at all times.

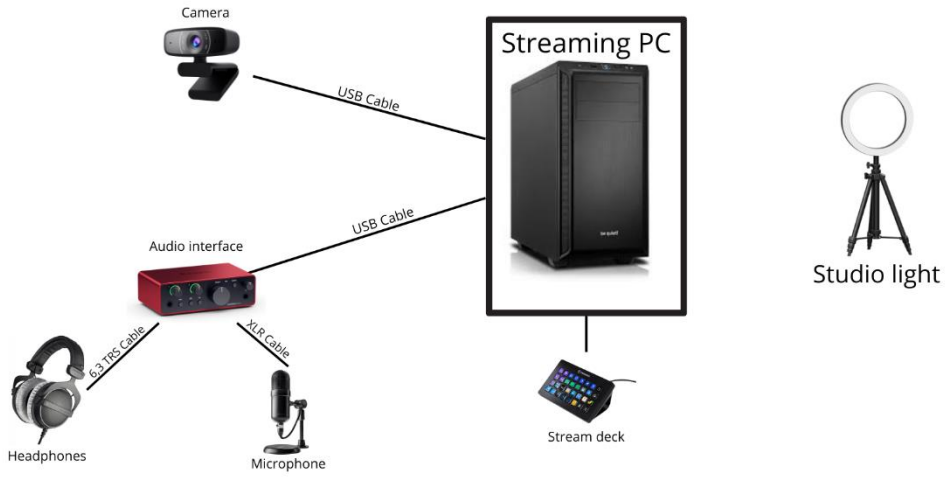

Figure 3, Pc, peripherals (mouse, keyboard), audio interface, headphones, microphone, stream deck, camera and studio light

Example Setup 3

As the last example setup, we introduce the most complex one of these three examples. This setup utilizes professional streaming gear. As the priciest one of the three, this setup is mostly for those already making their living off streaming or broadcasting. This setup also offers an opportunity for streaming with a console.

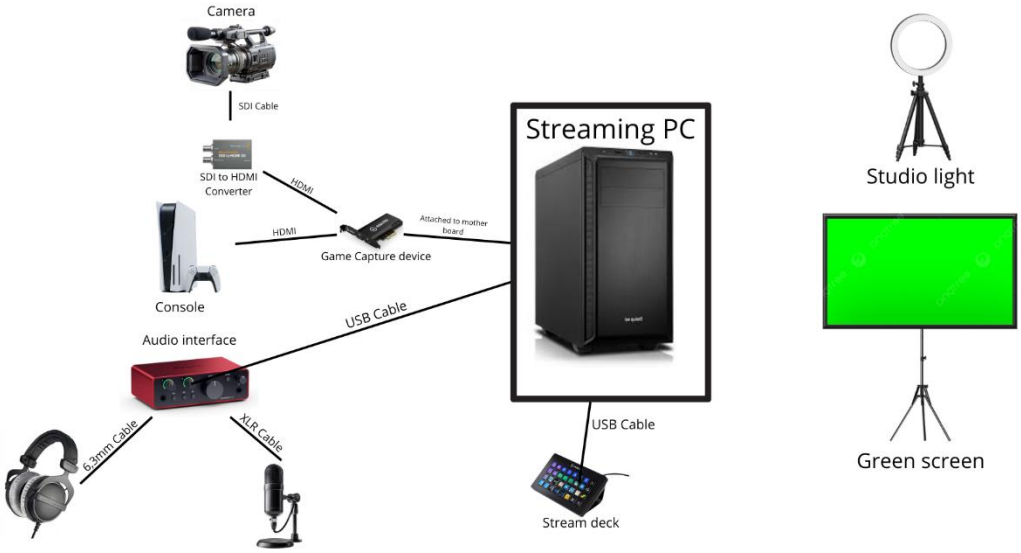

Figure 4, Pc, peripherals (mouse, keyboard), audio interface, headphones, microphone, stream deck, studio light, green screen, game capture device, camera, SDI to HDMI converter, console

4.2.2 Network and bandwidth

When operating in the streaming ecosystem, one's network connection and bandwidth rise to a high importance. Therefore, making sure your internet connection is stable and provides enough bandwidth for you to stream and possibly play online, if an online game is something you are planning to stream. Using a broadband connection over a mobile connection is always preferable for a much more stable connection. In addition to this, an internet cable is much more reliable than using wireless connections.

The quality of your internet connection effects directly on the quality of your streams output. This happens through something called a bitrate system. Bitrate measures how much information is sent from your device and therefore effects the quality of the stream on the viewers end. In table 2 the bitrate system is explained convincingly to the point that this should provide you with solid options to choose from, when deciding on the resolution and quality of your stream.

Video Resolution (Pixel)	Video Frame (Frames per second)	Recommended Video Bitrate (kilobytes per second)	Recommended Upload Speed (Megabytes Per Second)
720p	30fps	1500-4000 kbps	2-5 Mbps
720p	60 fps	2250-6000 kbps	2.9-7.4 Mbps
1080P	30 fps	3000-6000 kbps	3.8-7.4 Mbps
1080P	60 fps	4500-9000 kbps	5.6-11 Mbps
1440P	30 fps	6000-13,000 kbps	7.4-15.8 Mbps
1440P	60 fps	9000-18,000 kbps	11-21.8 Mbps
4K	30 fps	13,000-34,000 kbps	15.8-41 Mbps
4K	60 fps	20,000-51,000 kbps	24.2-61.5 Mbps

Table 2, Explanation how bitrates work with different bandwidths. (YouTube, n.d.)

4.2.3 Game specific system requirements

Streaming games require certain specifications from the hardware used. Below we have listed the requirements for selected games. The listed requirements and recommendations are for only playing the games, so for streaming purposes, it is better to use hardware above the minimum recommendations, since streaming creates an additional load to the operating system. Selecting the streaming software has an effect on this as well, but this will be discussed in a separate section of this book.

EA Sports FC™ 25

	Minimum	**Recommended**
Operating system	Windows 10 – 64-Bit	Windows 10 – 64-Bit
CPU	AMD Ryzen 5 1600 or Intel Core i5-6600k	AMD Ryzen 7 2700X or Intel Core i7-6700
Memory (RAM)	8 GB	12 GB
GPU	AMD RX 570 or Nvidia GTX 1050 Ti	AMD RX 5600 XT or Nvidia GTX 1660
DirectX	Version 12	Version 12
Storage	100 GB	100 GB

Counter-Strike 2

	Minimum	**Recommended**
Operating system	Windows 10 – 64-Bit	Windows 10 – 64-Bit
CPU	AMD FX-6300 or Intel Core i5-2500k	AMD Ryzen 7 2700X or Intel Core i7-9700k
Memory (RAM)	4 GB	16 GB
GPU	AMD RX 580 or Nvidia GTX 1060	AMD Radeon RX 5700 XT or Nvidia RTX 2070
DirectX	Version 11	Version 11
Storage	60 GB	60 GB

League of Legends

	Minimum	**Recommended**
Operating system	Windows 7, 8 or 10	Windows 10
CPU	AMD A6-3650 or Intel Core i3-530	AMD Ryzen 3 1200 or Intel Core i5-3300
Memory (RAM)	2 GB	4 GB
GPU	AMD Radeon HD 6570 or Nvidia GeForce 9600GT or Intel HD 4600 Integrated Graphics	AMD Radeon HD 6950 or Nvidia GeForce 560 or Intel UHD 630 Integrated Graphics
DirectX	Version 10	Version 11
Storage	16 GB	16 GB

4.3 Platform selection

Choosing the platform, you want to stream on plays big part in your future streaming career. Currently there are many different platforms where you can stream, like Twitch, YouTube and Kick. Twitch is the platform many decide to stream on, because of its popularity. Twitch offers a lot of tools for streamers, and after you gain followers on your account, it gives you more options for viewer engagement. Chat integration in Twitch offers more interaction between the streamer and the viewers. The wide variety of extensions in Twitch also boosts the interaction through polls, mini-games and channel points.

YouTube streaming offers better video-on-demand (VOD) options for viewers. The possibility of downloading your stream as a video gives more long-form content for viewers that are not familiar with live streaming or can't attend in the live stream. YouTube shorts also offer a good platform for engaging new viewers, by posting highlights from the streams.

The popularity of game streaming in TikTok has also risen in recent years. The downside of streaming in TikTok is the restrictions in live streaming. New users can't stream on the platform and that's why many streamers who already have a following elsewhere start streaming in TikTok. TikTok streaming is commonly for extra interactions and viewers, and users usually stream in Twitch or YouTube at the same time. Many seasoned streamers use multistreaming software like ReStream to stream on multiple platforms, but this will be discussed later in the software selection part.

Although there are many options to choose from, there is no correct answer when deciding your choice of platform. Household names like Twitch and YouTube are the most popular ones, and they offer different things for the streamer. The goal you want to achieve from streaming defines which platform you should use in your streaming career.

4.4 Software

Once the hardware has been set up, and the platform on which the stream will be put out has been selected, it is time to choose the streaming software. Streaming software is essentially software which gathers all the different input sources together and encodes them into a live stream format. Choosing the right streaming software for your streaming purposes is a key decision to be made early on in your streaming career. We will introduce the two most common software used and explain their strengths and weaknesses, but for choosing the right software for you, a rule of thumb can be used: If you are experienced with "computer stuff" and know your way around, go for the more versatile and a slightly less consumer-friendly OBS Studio. If on the other hand you are a beginner in the PC world, choose the more consumer-friendly, yet far less customizable Streamlabs OBS. Below we have listed the good and bad qualities of the aforementioned software.

4.4.1 OBS Studio

Open Broadcaster Software, more commonly known as OBS Studio, offers the streamers an adjustable platform for streaming and recording videos. Due to OBS Studio being open source, software developers have created various plugins and modifications to the software. This has been an essential part of the development of the software. OBS Studio is completely free to use with

all its features included, which gives it a competitive advantage over some of its competitors, such as Streamlabs, which will be discussed later. Another advantage for OBS Studio is the rather minimal requirements it has for running. With OBS Studio, streaming is possible even with a slightly worn and not so powerful computer. The downside of the software is that the user interface can easily be confusing for those just beginning their journey as a streamer.

OBS Studio

	Minimum	**Recommended**
Operating system	Windows 10	Windows 11
CPU	Intel i5 2500K or AMD Ryzen 1300X	Intel i7 8700K or AMD Ryzen 1600X
Memory (RAM)	4 GB	8 GB
GPU	GeForce GTX 900 series or Radeon RX 400 series or Intel HD Graphics 500	GeForce 10 Series or Radeon 5000 Series or Intel XE
Storage	600 MB	600 MB

4.4.2 Streamlabs Desktop

Streamlabs is software that is optimized for streaming. It offers wide variety of tools and widgets for its users, and they are easy to set up. The software is based on the code of OBS Studio, and it was formerly called Streamlabs OBS. The main upsides of using Streamlabs come from the number of features that are built in the software. For example, in Streamlabs you can set up alerts for followers, subscribers and other information easier than in OBS Studio. Streamers using OBS Studio often use the widgets from Streamlabs in their streams even when they use different software. The creators of the software offer Streamlabs Ultra subscription, which provides vast amounts of new tools for easier and better content creation. The best tool from the Ultra subscription is the ability to multistream to multiple platforms at the same time. The list below shows the minimum and recommended system requirements for using the Streamlabs software.

Streamlabs Desktop

	Minimum	**Recommended**
Operating system	Windows 10	Windows 10
CPU		Intel Core i5 (11^{th} or 12^{th} gen) or AMD Ryzen 5000 series
Memory (RAM)	8 GB	16 GB
GPU		Nvidia RTX 20 series or AMD RX 5000

4.4.3 Honorable mentions

Restream

As there are various tools and software that content creators can use on their journey, we only mention a few of our favorites to use. Restream is software used by streamers who want their stream on multiple platforms. The software relies on a subscription model, and as such the real need for multistreaming has to be carefully assessed to align with the investment made. With Streamlabs coming up with their own multistreaming service, Restream could be seen as out-dated software.

Voicemeeter

Voicemeeter is another supporting software for streamers of all kinds. Titled as a “digital audio interface” voicemeeter allows multiple audio input sources even without a physical audio inter-face. Though as the user interface may be somewhat complicated, with the right number of in-structions it can be a very useful tool in streaming. Also, when doing studio broadcasts with, for example, two casters, this is the most cost-effective way of achieving this, as the software itself is completely free to use.

4.5 Streaming with a console

Streaming with a console can be achieved mainly through two different ways. The newest line of consoles such as Play Station 5 and Xbox Series X offers the possibility to stream through the console itself. In the past the console had to be routed through the streaming PC to be able to share the screen of the game. The other option for streaming with a console is to connect the console to a PC through a capture card. Capture card is a device that allows a conversion from a HDMI to USB and thus makes the connection of a console possible.

Since the new generation consoles offer the possibility of streaming without an external streaming PC, streaming for console players is now more accessible than ever. However, the price of a next-generation console is relatively high, which divides the PC and console players further apart, since getting both a gaming computer and a next-gen console is a rather large investment.

5 Building a Broadcast

In this part of the handbook, we will be going through setting up a broadcast in different scenarios and on different platforms. The platforms we chose for this are those discussed earlier on in the thesis, which are OBS and Streamlabs Desktop. Even though both software programs are based on the same source code, the user interfaces differ enough for it to be the best solution to write setup guides for both of them separately.

vMix as software was intentionally left out from this guide, as the leap from these two to that is relatively large. Also, using vMix is considerably more expensive, since rather than being a free-to-use platform, the license to use vMix costs a rather sizeable amount of money. However, vMix operates very similarly to OBS and Streamlabs on basic principles, and the major difference comes from the wide range of different additional adjustments. vMix is widely used as the streaming and media production platform on the professional level of production, especially in broadcasting. vMix also has a YouTube channel which provides a lot of useful information and tips for getting started with the software.

5.1 Setting up OBS Studio

As the more versatile, yet less user-friendly program, the user interface (UI) of OBS Studio can be intimidating, we will use a lot of imagery of the user interface to help explain the how's and why's. In this section we will explain the core concepts and functionalities of the OBS Studio. This section helps straighten the learning curve of OBS Studio and explains the key elements and most important focus points when it comes to setting up a stream on this software. As the software is versatile in terms of its functionality, we will only examine the functions we have deemed most important, using our experience as the reference point to guide us with what information to discuss in this part. For further information regarding specific functionalities, there are multiple sources of information.

5.1.1 OBS Studio user interface

The typical layout of OBS Studio is shown in figure 5 and 6. Starting from the black screens, this is where all your output will be shown. In figure 5 everything that is happening on that screen will be on the stream. In figure 6 the screen on the right is showing what is currently shown on stream, and the screen on the left allows you to preview and edit another scene whilst not being on-air. The “transition” button in the middle will trigger the switch of these two scenes, meaning that the one that was in the preview will now be on the right, and the one that was on-air will be in the preview window. The studio mode can be triggered from the “controls” section, that is located in the bottom right corner of figure 6.

On the lower third of the interface are all the different sections we will be going through in this part, containing all the necessary information for a quality stream. These sections contain different information regarding all the elements used in the stream. This section is used to control everything that’s happening in the stream.

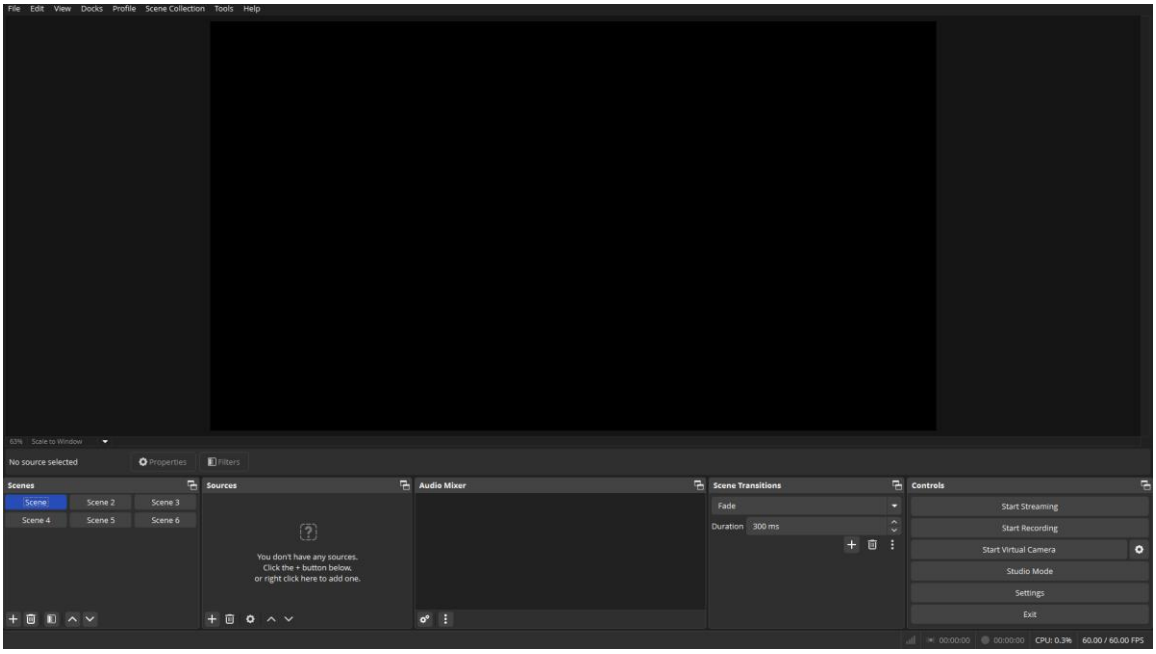

Figure 5, The UI of OBS Studio in standard mode.

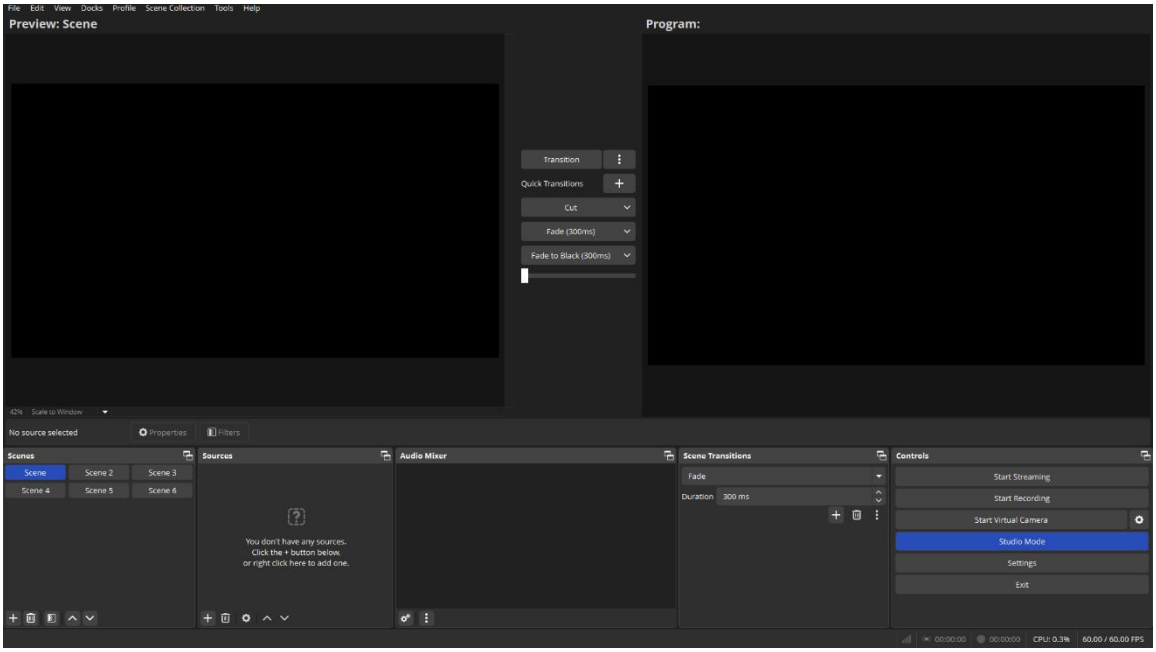

Figure 6, The UI of OBS Studio in studio mode.

5.1.2 Scenes

Firstly, we introduce the ´scenes´ section. This section is located in the bottom left corner of the UI, as it is shown in figure 7. The core function of this section is to control which scene is displayed on screen. In this part new scenes can be added, the order of these scenes can be changed around, and unnecessary scenes can be deleted. There are two different layout options for the scenes: A list of scenes, that will be the default option, when starting up OBS Studio for the first time, and the grid view, that is shown in figure 7.

What a scene is, is basically a way to save specific elements to each part of the broadcast/stream, to help navigate fluently between different parts. Scenes include information from different sources, such as games, or audio devices, along with different elements, such as overlays and effects.

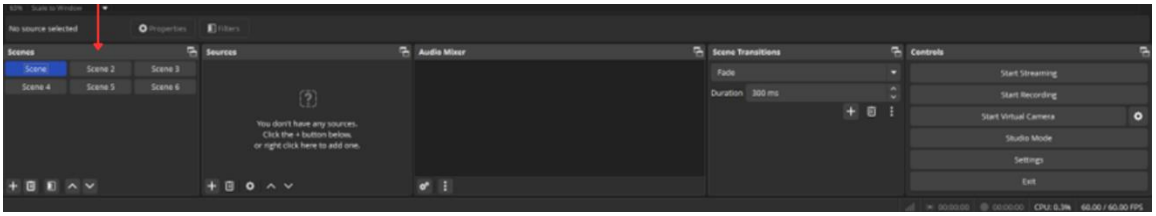

Figure 7, Scenes

5.1.3 Sources

By default, the next section on the right side of scenes is the sources, shown on figure 8. This section is where all the sources such as audio devices, camera, game view, etc. are shown. Basically, the list of sources is a list of things you see or hear in the current scene. The sources are scene-specific, allowing the customisability of the scenes. It is vital to always remember to check which sources are in which scenes, as being aware of these helps avoiding mishaps when streaming.

Adding sources happens from the ´+´ button, that opens a dropdown menu, with all the possible source types available. Filters can be added to the sources by right clicking an added source and selecting filters. From here you can add effects and filters to different kinds of sources.

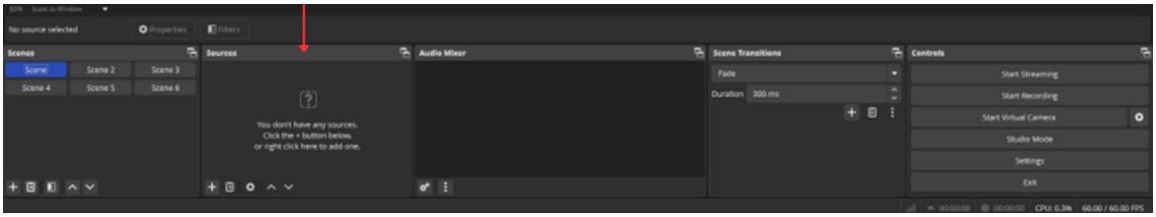

Figure 8, Sources

5.1.4 Audio mixer

Next up, the audio mixer shown in figure 9, with the addition of the advanced audio properties in figure 10. These parts show all the active audio sources and lets you adjust their volume and possible monitoring. The audio sources will be adjustable with a slider and the volume of a track is shown in the form of a dB meter.

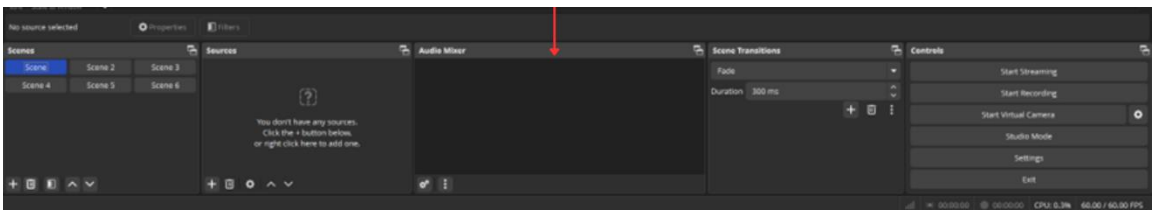

Figure 9, Audio mixer

5.1.5 Advanced audio properties

The advanced audio properties, shown in figure 10, lets you adjust the audio devices on a more advanced level, which will be explained to detail here. A track can be forced into a mono sound, meaning that the audio is the same on left and right, but it can also be panned from to either left or right side from the slider. Sync offset is meant for the case of a desync between the video and the audio source. To put it simply, if the sound comes later than the video, the sync offset can help with aligning the sources together.

Audio monitoring is the only tool we pay closer attention to, on this book. This is in a case of a studio level broadcast, where getting the game sound to the casters' ears is needed to help them focus on what is happening in the game. There are three options for the monitoring: Monitor off, Monitor Only (mute output), and Monitor and Output. Most commonly if this monitoring is required, the third option 'Monitor and Output' is the most suitable one. This is due to the monitoring being activated, but also the sound going out on stream as well.

The main uses for this come from when the game source is not in the stream PC, but instead on an external device, such as another PC, used purely for observing and running the game. This 2 PC setup is a very efficient way of ensuring the performance of the stream PC, important especially in longer streams that are much heavier from the production side.

Another example of an external game source is a live feed. This is a very common way of operating in the esports field, when it comes to broadcasting the bigger, often international tournaments. The live feed is essentially a feed that the tournament organizer sends for their distribution partners, so that they can stream the games on their own accounts. If the tournament organizer has their own stream, the live feed they send is often the same exact one, but without casters and possibly without their own ads. In the case of the ads being removed, this feed is called a 'clean feed'.

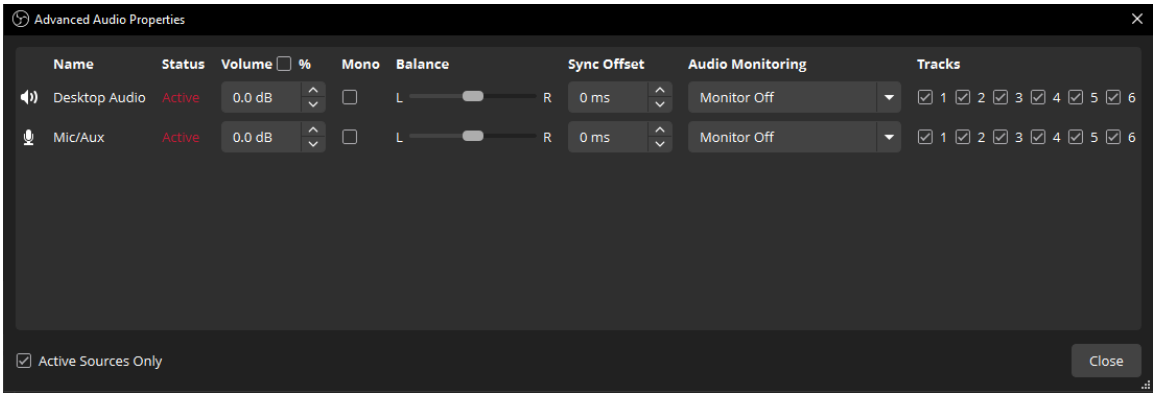

Figure 10, Advanced audio properties. This is the advanced view of the audio mixer, shown in figure 9.

5.1.6 Video settings

Starting from video settings (figure 11), the usage of this part is relatively self-explanatory. In this part you can adjust the resolution of the stream, as well as the frames per second (Fps). Frames per second affects the 'smoothness' of the watching experience, as the more there are frames per second, the sharper all the movement seems on stream. Meanwhile streaming a Full HD stream with 60fps is an intriguing idea, and surely something to aim for, it is vital to remember the possible limitations opposed by your hardware, especially your streaming PC.

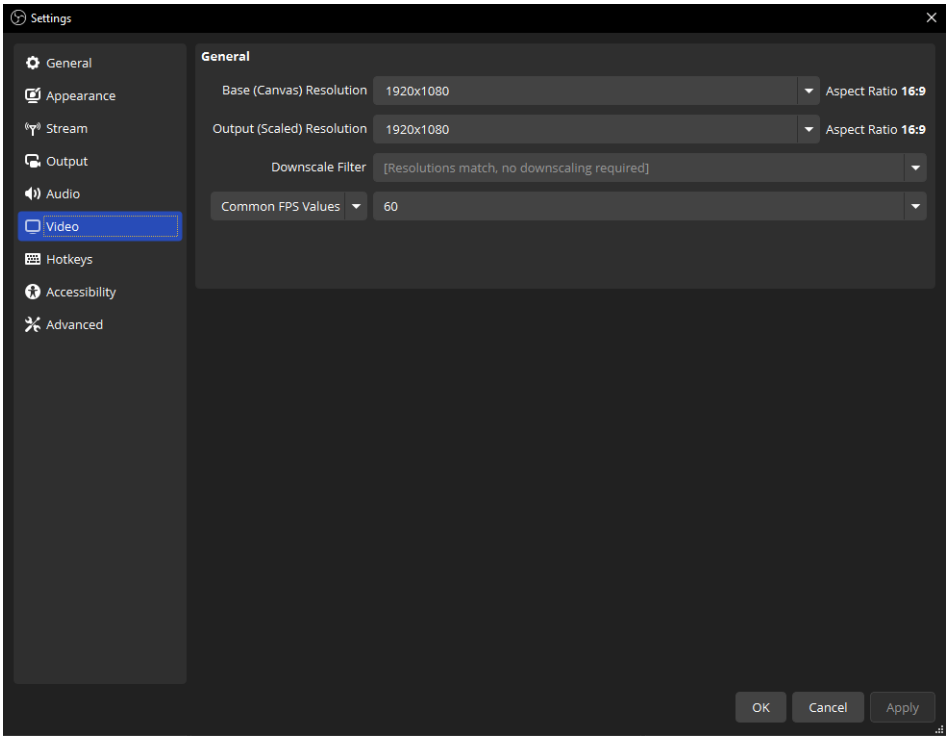

Figure 11, Video settings

5.1.7 Audio settings

Audio settings allow adjustments to various audio technical aspects of the software, but we mainly focus on the ‘channels’ and ‘monitoring device’. In most cases the channel should be put to mono instead of stereo, since this ensures the levelled listening experience, with an equal right-left balance. The monitoring device is important to be set as the correct device, in case of the monitoring being a necessary part of the stream, such as events discussed earlier.

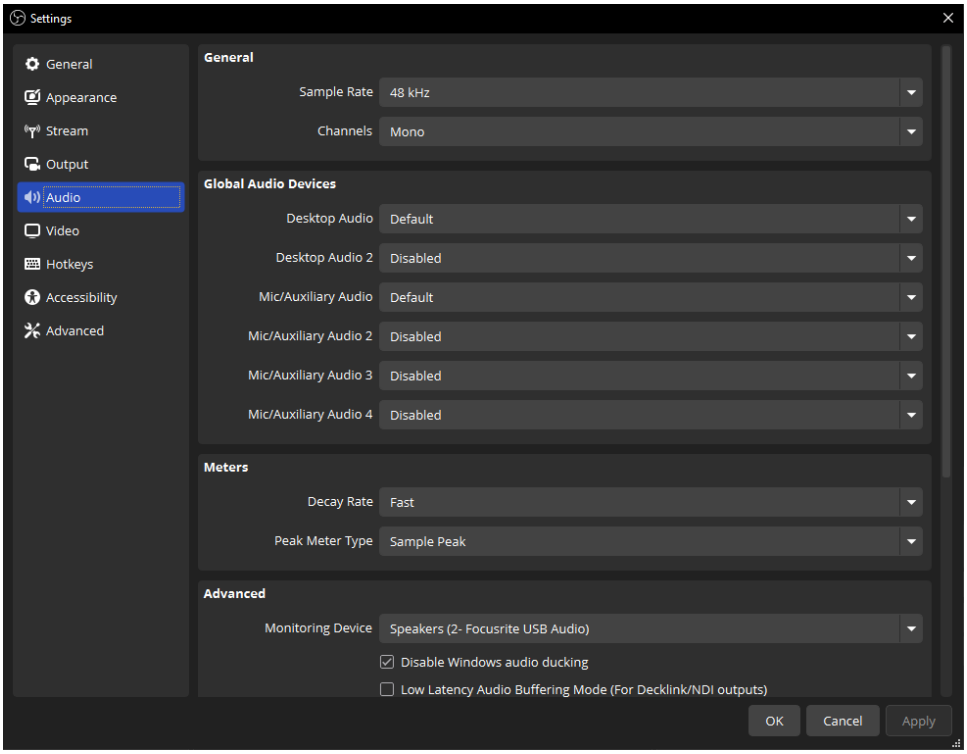

Figure 12, Audio settings

5.1.8 Output settings

Expressed in figure 13, output settings contain adjustments regarding to the usage of bandwidth and the overall quality of the output, as well as encoding. Keeping the settings on the simple level, figuring out the correct bitrate is vital for the performance and viewability of your stream. Bitrate, as explained in table X, measure the number of bits being sent, which effects the quality of your stream on the viewers end. Platforms such as Twitch have set limitations for streamers to only be able to stream with a bitrate up to 6000. This bitrate is perfect for streaming with 1920x1080 or 'Full HD' resolution and 60fps.

For video encoder, it is important to know what kind of hardware you are operating with. If the GPU is sufficient enough, the Hardware (NVENC H.264) option is the one to go with. This does increase the stress load on your GPU, but the quality of output is higher on this setting. The encoder preset is usually good to be selected as P5-P7, where the output quality is satisfactory.

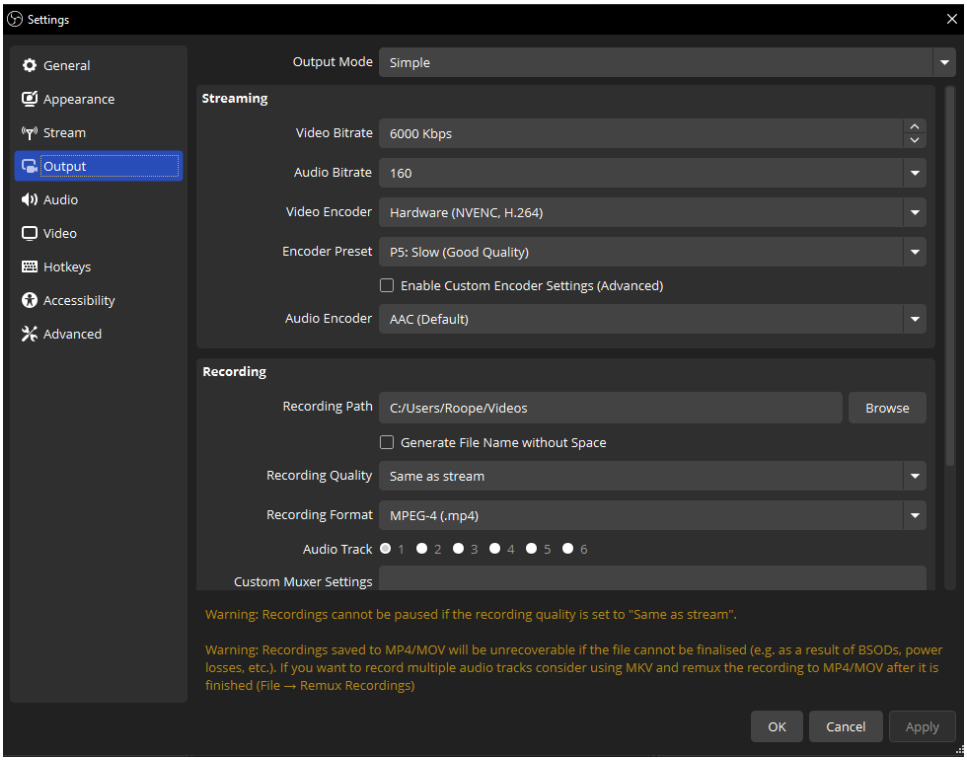

Figure 13, Output settings

5.1.9 Stream settings

Starting from the top of figure 14, you can choose the platform to stream to. Clicking on the arrow on the top right corner opens a dropdown menu, from which you can choose from multiple different streaming services to stream to. Moving down is the Server option. This should be set to Auto, as suggested by OBS as well.

Next one down is the slot for a stream key, or the other possibility to connect your account directly. These options are specifically for streaming to Twitch, but other platforms offer similar options as well. Both options have their perks. Usually when operating on your own account it is much easier to directly log in with your account, than using a stream key. In the case of producing a stream for some other account than yours, you will often be given a stream key, that is as simple as it sounds. Copy & paste the stream key to this slot and click ‘apply’ and ‘ok’ to confirm your choice. If you’re operating with a stream key, you cannot change the data of the stream such as the title, or the genre of the stream from OBS, and will have to have someone do this separately from Twitch’s browser version. Logging directly into your account on OBS Studio gives you the option to change this data without opening the browser separately.

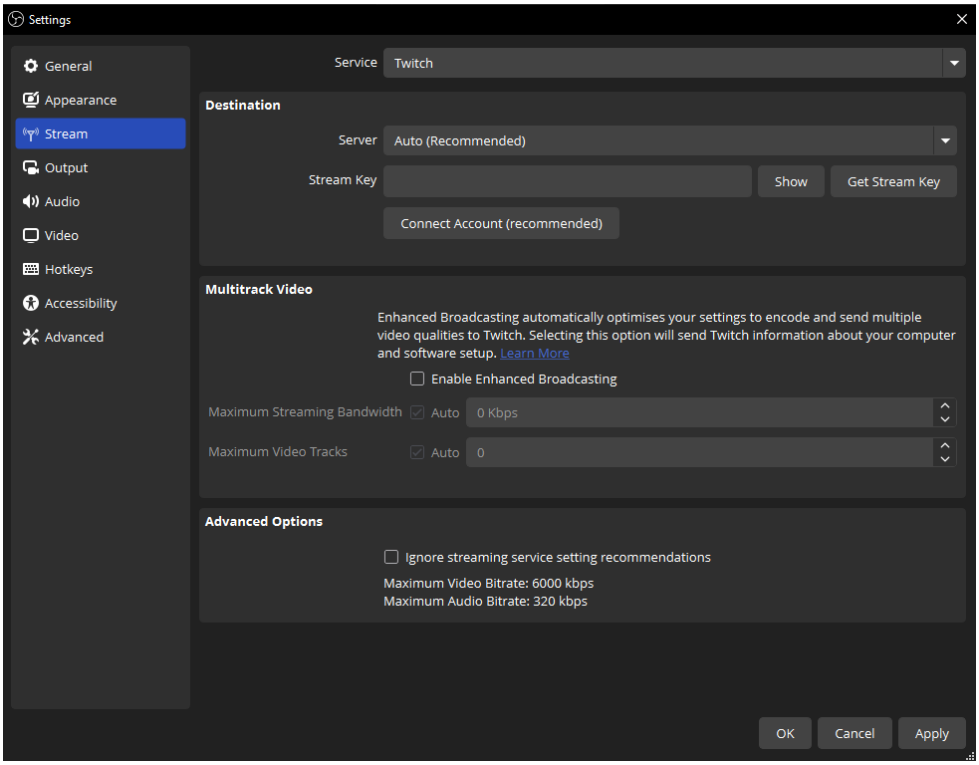

Figure 14, Stream settings

5.2 Setting up Streamlabs Desktop

Streamlabs Desktop was created from the source code of OBS, and that's why it looks like the OBS Studio software. Streamlabs looks more user-friendly when you first start the software. It also has some useful "widgets" for the streamer that can for example show follow alerts. This section aims to provide useful information for the user. Aim is to show information and give tools for getting started. The information is more general and will not go into the more in-depth functions and tools. Our own experience of streaming is used as a reference point in this section. For more advanced information and features, there are a lot of free guides and YouTube videos.

5.2.1 Streamlabs Desktop user interface

As seen in Figure 15, this is what Streamlabs Desktop looks like when you open it. Black box in the middle shows the screen that is currently shown in the stream. The main difference in the UI of

Streamlabs compared to the OBS is that there is the box “Mini Feed”. When you log in to your account in the software, the mini feed shows useful information for the streamer. These can be new followers, subscribers or donations. Boxes can be adjusted from the small white bars.

The bottom part of the interface shows all the things that can be seen or heard in the stream. Most of the sections below will have the same information as in the OBS Studio part above, but the key features that can only be seen in Streamlabs will be mentioned.

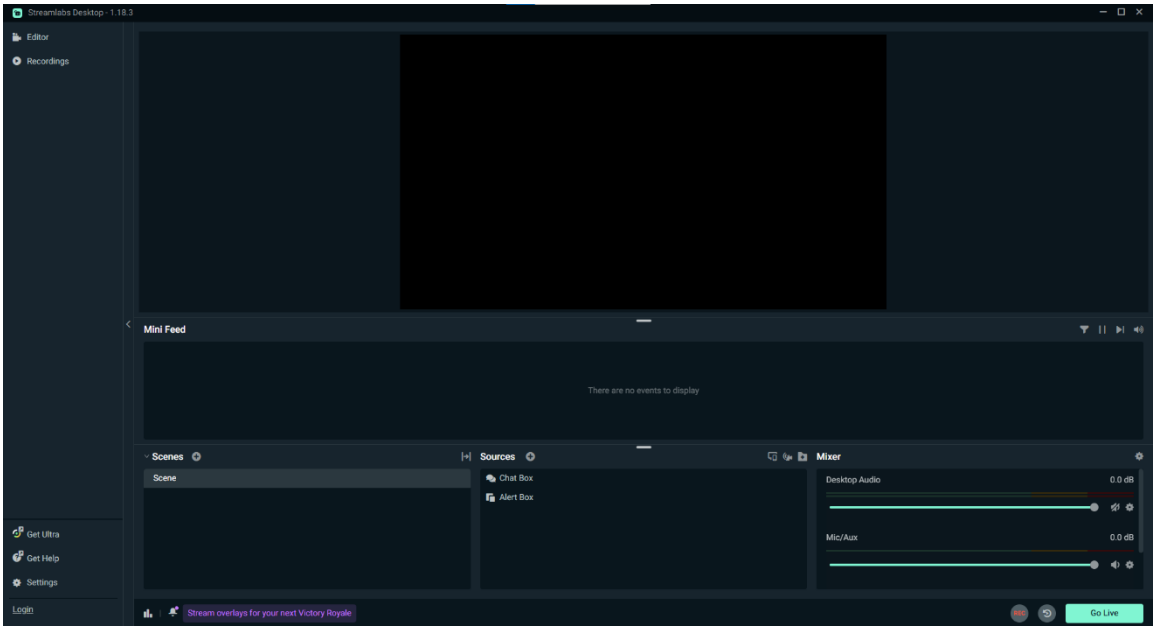

Figure 15, The UI of Streamlabs Desktop

5.2.2 Scenes

Adding scenes in Streamlabs is same as in OBS and you can do it by just pressing the “+” button. With the Streamlabs Ultra subscription, Streamlabs gives you the ability to use premade overlays for your stream. The overlays save a lot of time and effort when building a stream. These will have all the sources and scene collections ready. More information about the scenes can be found from 5.1.2.

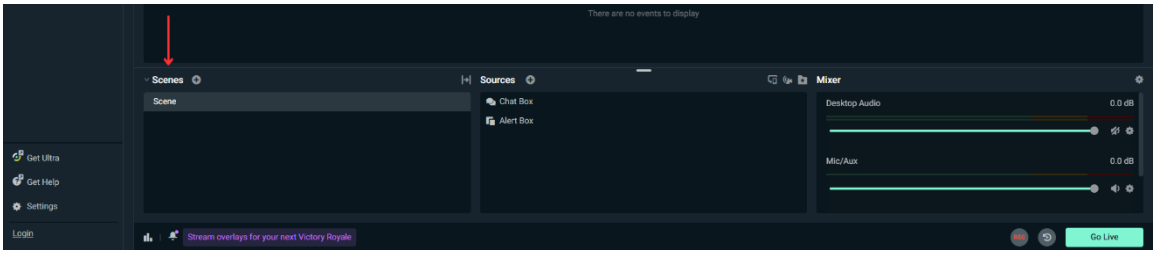

Figure 16, Scenes

5.2.3 Sources

Adding sources in Streamlabs also follows the same principles as in OBS. Instructions on how to add sources can be found from 5.1.3. Streamlabs also gives the ability to add widgets as a source. These widgets can give viewers information in form of donation goals, follower goals or alerts.

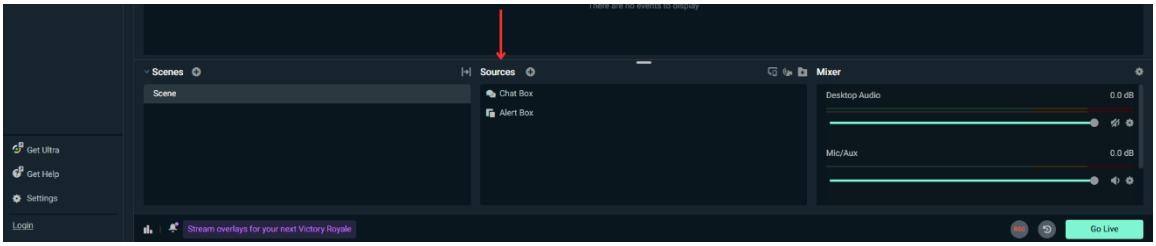

Figure 17, Sources

5.2.4 Mixer

Mixer in Streamlabs can be found from the right side of the software. The mixer shows the volume of audio sources such as game audio, desktop audio or microphone. With the sliders beneath the source, volume can be adjusted.

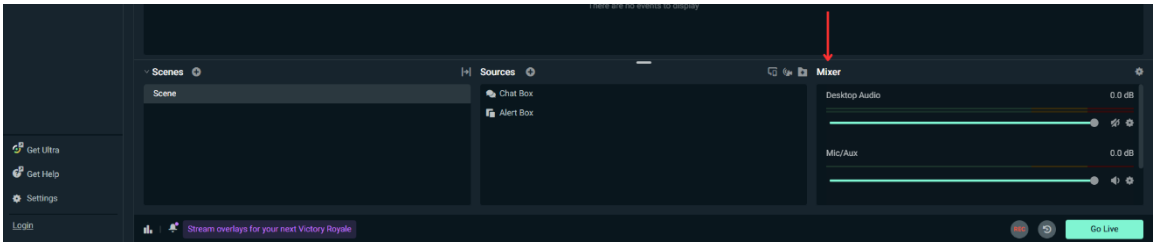

Figure 18, Mixer

5.2.5 Mini feed

The Mini Feed is one of the few things that can be seen in Streamlabs and not in OBS studio. Mini Feed shows information from your Twitch account. The Feed can for example show new followers, subscribers and donations.

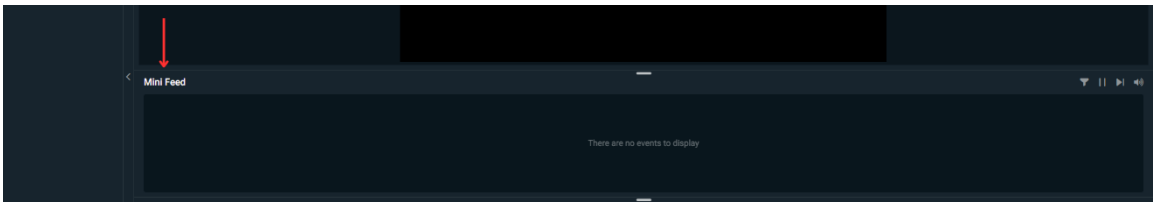

Figure 19, Mini Feed

5.2.6 General settings

General settings in Streamlabs look different compared to settings in OBS Studio. In Streamlabs there is the addition of search bar in the top left corner (*Figure 20*), which can help find the settings you are looking for. General settings also offer the ability to import scene collections straight from OBS Studio. Some features might not work correctly after importing from OBS.

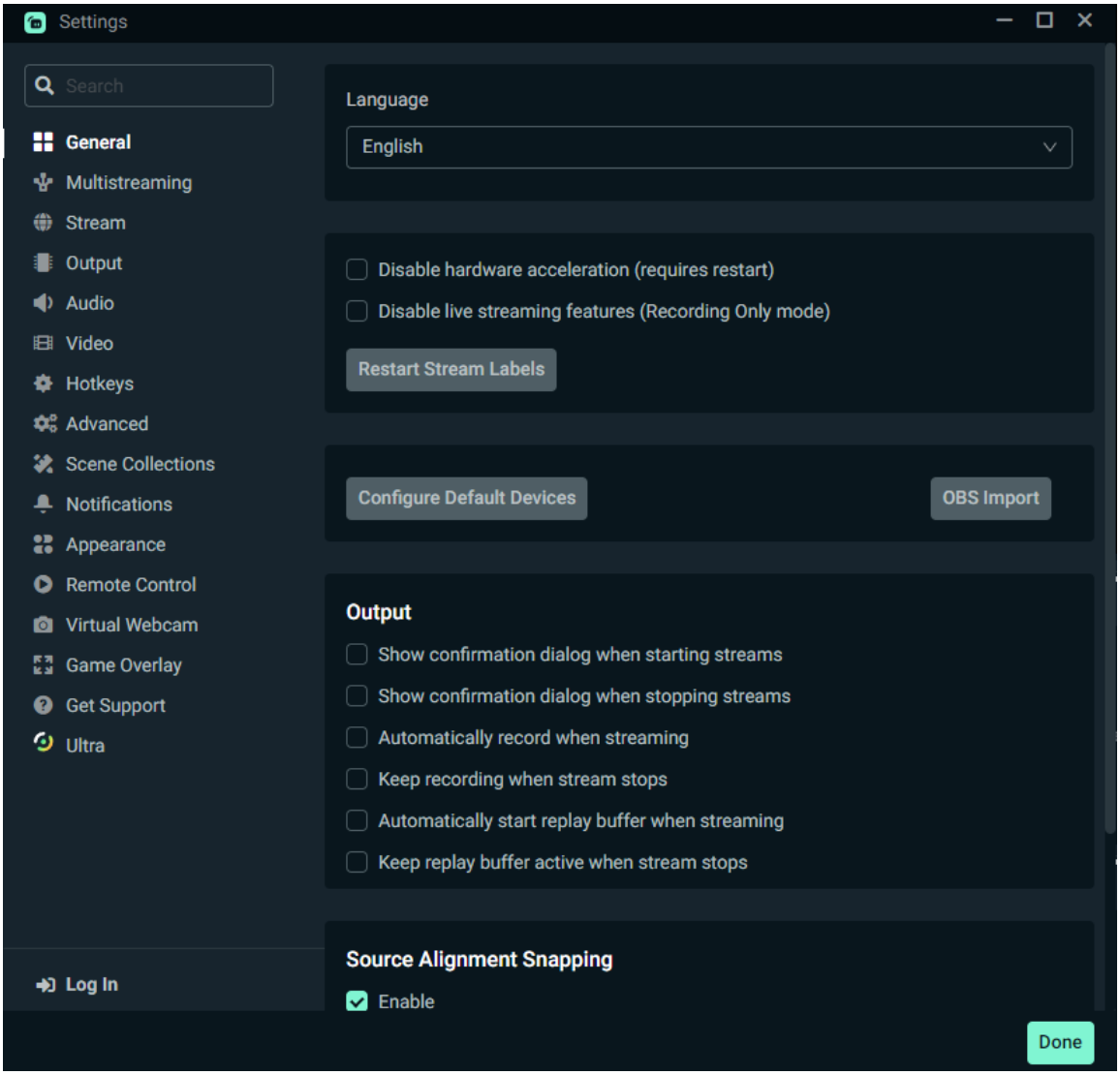

Figure 20, General settings

5.2.7 Video settings

Video settings have the same features as the OBS software. In this section of settings, you can set the resolution and fps values for the stream. For the optimal settings see 5.1.6.

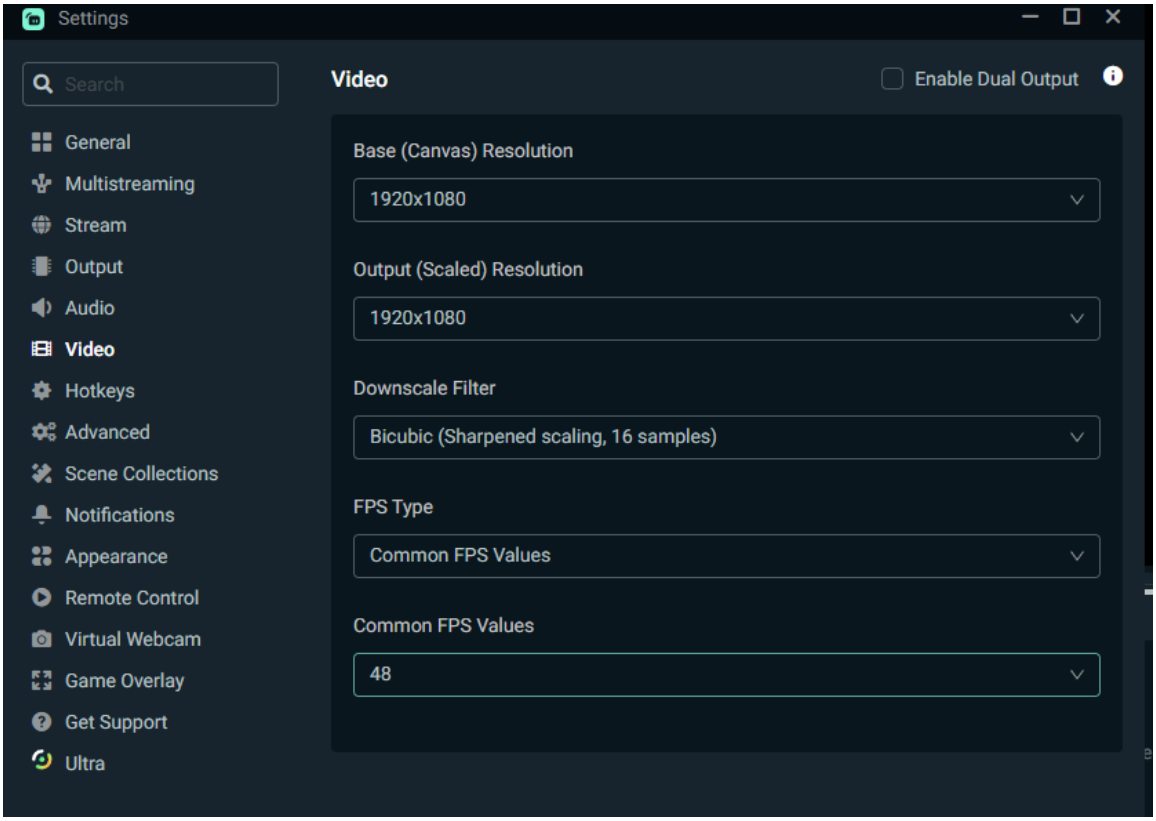

Figure 21, Video settings

5.2.8 Audio settings

The interface in the audio settings again has the same properties as OBS. Here you can set the sample rates and channels (Studio or Mono) for the stream. Also, audio devices can be seen here. Optimal settings for these can be found from 5.1.7.

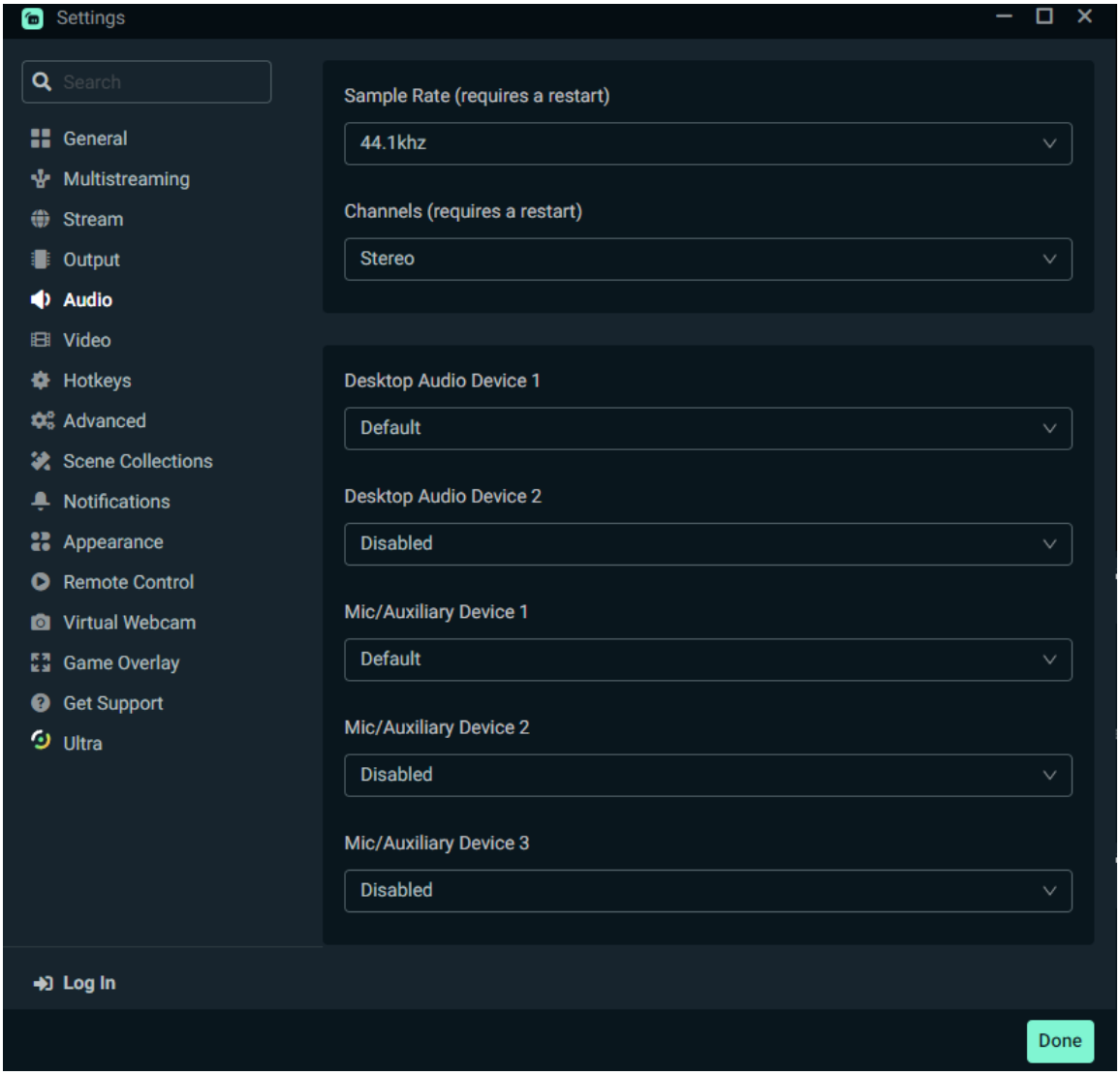

Figure 22, Audio settings

5.2.9 Output settings

Output settings have the settings for the outgoing stream. In this section, you can select audio tracks, output mode and bitrate settings. Also, the encoder settings can be found from here. For the optimal settings and recommendations see 5.1.8.

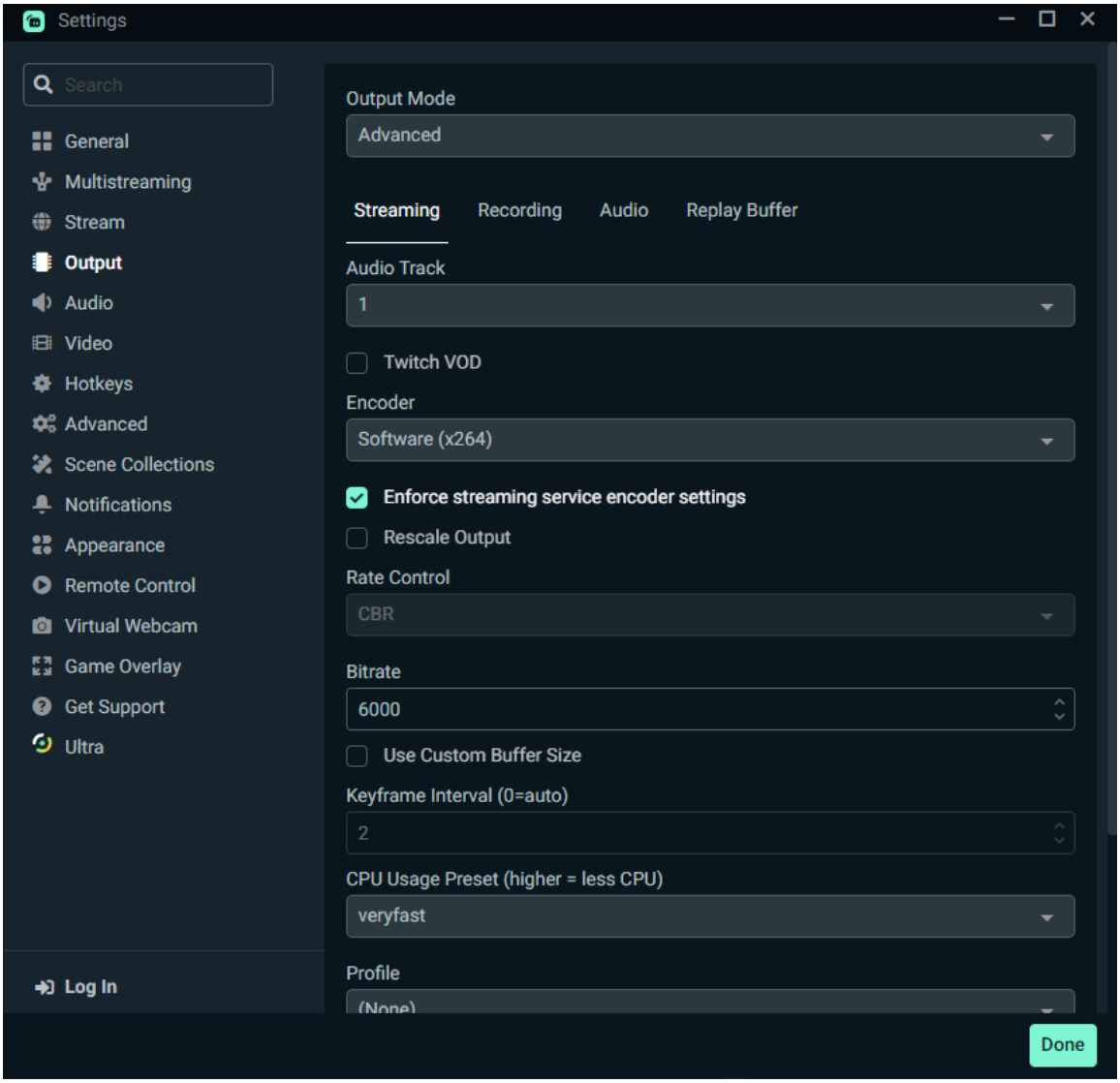

Figure 23, Output settings

5.2.10 Stream settings

Next is the stream settings. In this window, software offers to choose where the stream ends. By logging in to for example Twitch account, the stream will go the correct place. Recommendations can be found from 5.1.9.

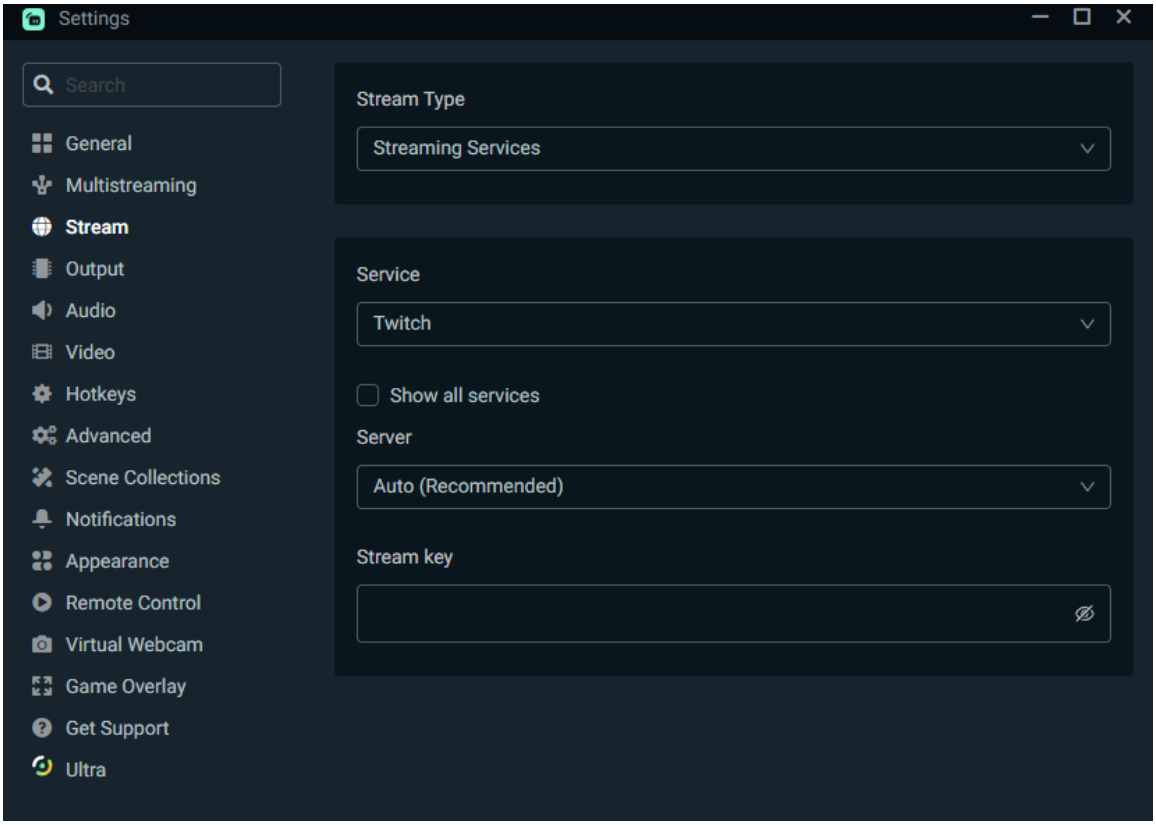

Figure 24, Stream settings

5.2.11 Advanced settings for audio and microphone

Compared to OBS Studio, Streamlabs has different sections for Advanced audio settings and advanced microphone settings. In these windows you can set the monitoring for the sounds or select which device you want to use. For more in-depth information see 5.1.5.

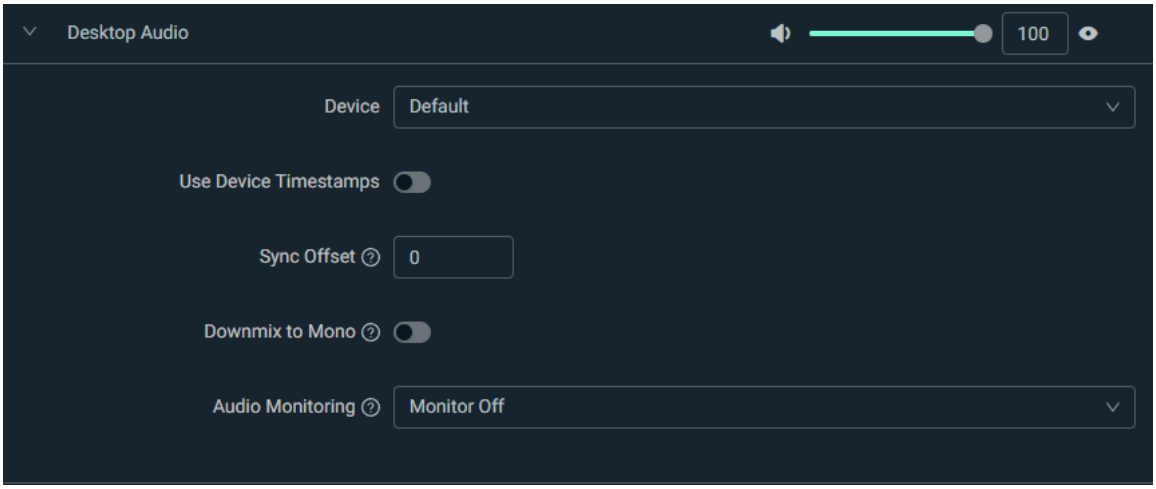

Figure 25, Advanced settings for Audio

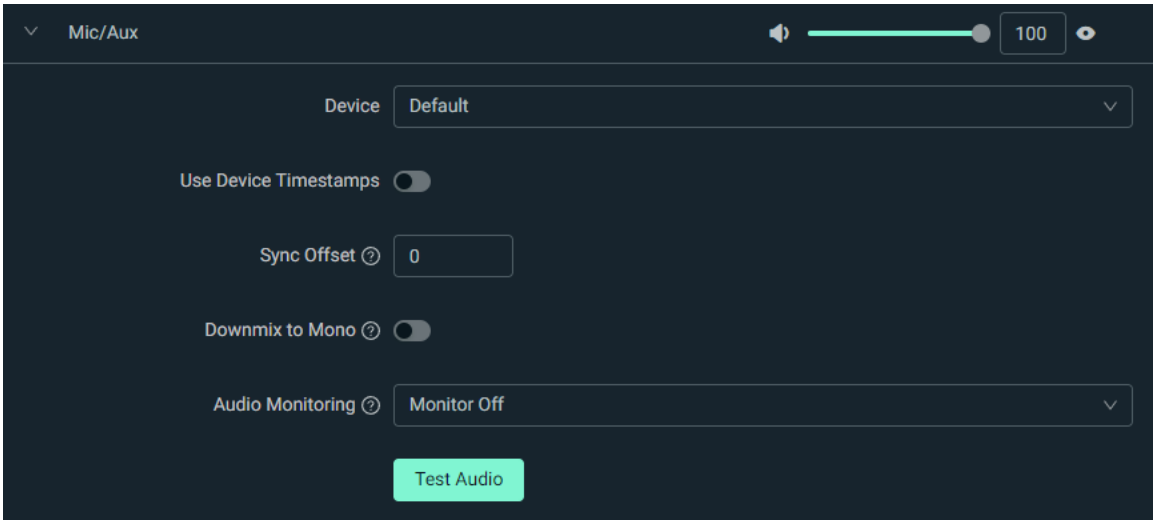

Figure 26, Advanced settings for Microphone

5.3 Importing a pre-built scene collection

Especially when working in various on-site locations producing streams for multiple third parties, the possibility of creating a scene collection for later use is a very handy tool. This allows the creation of entire setups, down to the sources and graphics, sparing the time of setting the OBS up, when working on-site in a live event. Since building studio setups in various locations is a task in itself, streamlining this process is important. Building a scene collection for OBS also helps with the planning and preparation of the stream.

Quite simply exporting and importing OBS setups happens from ‘Scene Collections’ located on the bar on the top of the UI. From there you select ‘export’ and choose the destination to which you want the scene collection to be saved. You can, for example, save it to a flash drive, which is handy to carry with you, and easy to manage, when setting up on a new PC.

Importing a scene collection happens from the same spot, quite literally as reversed steps from exporting. You select import and search for the correct location, where the pre-built scene collection is saved. It is vital that you also save all the graphics and other sources used in the scene collection in the same folder, so that OBS can find the correct elements for each scene. This is something that can easily be overlooked.

Streamlabs Desktop software offers the ability to import scene collections straight from the OBS Studio. This feature can be found in the settings tab in Streamlabs (*Figure 20*). The downside of this feature is that some of the features might not work correctly. Especially scenes or features that use plugins might have some issues.

5.4 Checklist for stream setup

Below we have created a checklist to help you keep track of the setup process and to remember all the steps required when setting up a streaming environment. We recommend you save this checklist for easier access when it is needed. This list is precisely created for a stream run on OBS Studio, but as Streamlabs Desktop is built on the same source code, most of the items on this list work in that as well.

Scenes	All the scenes have the correct sources. (Example scene collection: Start, In-game, Studio/Camera, Break, Ad break, Ending)
Equipment	Microphone(s), Camera(s), Audio output device (headphones, mixer)
Game	Updates, game settings, game capture (visible in streaming software), game sound (output device is set to same as in streaming software)
Stream and output settings	Fps, Resolution, Encoder preset, Bitrate, Streamkey/platform/log in to account
Audio and video settings	Correct audio input and output devices, camera settings (resolution), video and audio sync
Scene transition	Correct transition selected

6 Creating a Studio Environment

When designing a more advanced broadcast, building a physical, or a remote studio setting plays an important role. This job involves taking the time to get all the gear and software set up in an efficient way, to ensure a good workflow and a relaxed vibe for all the personnel working in it, whilst still maintaining high functionality. The importance of the setup being also aesthetically pleasing will project itself in the stream itself, as the on-air talent will be much more comfortable in a good-looking setting. Professional looking setting will also convince the viewers of the quality of your output, which will further improve the streamer-consumer relationship.

This part explains how to build a studio setup, and what to pay attention to when doing so. We will also be giving out guidelines to help further understand what is important to take into consideration, when designing and building your studio setup. As studio setups can be built for a short-term temporary, or a long-term stable usage, we aim to help with understanding how to improve in designing and building an environment for studio work both on-site and remotely.

6.1 On-site studio

Building a studio on-site can mean two different things: setting up a temporary studio for a live event or building a long-term studio for sustainable use. In this part we discuss the latter of the two, since though they are similar to each other in details, there are a set of variables to take into account when building in a live environment, that do not exist in a purpose-built studio. Setting up in a live environment will be discussed later in the text with our case examples from a few different setups.

Below we will discuss everything you can see in our example studio setup, shown on figure 27. This setup is meant for a stream with on-air talent, and a separate producer/director, and as such the information might not be completely applicable for your setup, but should help explain what to take into consideration, when building one. Please check the additional notes for more detailed information.

6.1.1 Example setup

Starting from the top of the picture of figure 27, we have a background of sorts. Though this is not a mandatory piece in every setup, a good and well-designed background brings an element of professionalism and as such, can elevate your broadcast to another level. Something as simple as a curtain can be an effective background, but basically it doesn't matter what the background is made of, as long as it looks good on camera. This is a mentality that should be remembered when designing your own setup. For commercialization, the background is an ideal place for physical advertising. Placing logos of your sponsors brings them much more value, than just having the logo as a layout.

Continuing the commercialization theme, the caster desk, along with the casters themselves is a perfect place for product placement. As a rule of thumb: select a table that is simple and clean, or if you cannot find one, you can easily cover it up with a tablecloth. The table itself should include nothing else, than the caster's laptops, and possibly a mixer. Ideally, the caster desk could even have monitors for the casters themselves to see the live feed of the stream, but as this requires a substantial investment, we have the caster's monitor separately.

For the monitor, it is really all about the size and positioning. Since the monitor is only meant for keeping track of the stream's events, and seeing the live feed to cast a game, the quality of picture is not the top priority. More importantly, the monitor has to be good enough to have a clear image, so that all the details of the game can be seen even from a small distance. Since the monitor cannot be seen on camera, the placement of it plays an important role. It has to be carefully placed so that it is just outside the camera's view, but close enough to clearly see what is going on.

Another thing to keep out of the camera's view are the studio lights. In this example setup we have used two lights, but more can be used, if deemed necessary. Basically, there should usually be at least the same number of lights per people on-air, so that managing their shadows is easier. With two lights set on both sides of the casters there will on most occasions be left a dark spot in the background between the casters, but this can be worked around with changing the placement of the lights and possibly bringing the casters further out from the background. To save the retinas of the casters, the lights should never be directly pointing at their face, or if so, they should be high enough to not blind the casters. We suggest LED light panels, as the brightness and warmth of the lights can easily be adjusted.

Moving down, next item is the camera. Nothing much will be explained here about the camera-work, since it is pretty simple. Choosing a camera that supports Full HD with 60fps is commonly the ideal option for a studio setup. This example setup only utilizes one camera, but additional cameras can be added if there is room for it in the budget, and the studio space itself. In a two-caster setup a total of three cameras could be utilized, as there would be one main camera, and two face cameras focusing on just one caster at a time. This variety of cameras would surely increase the viewing experience but will not bring enough value compared to cost for us to recommend it.

Lastly, the heart of your stream operations, the producer's desk is located in the bottom right corner of figure 27. This desk contains all the necessary hardware for running the stream, and everything that happens on screen will be managed from here. Perhaps the most important and defining factors in choosing on the location of the producer's desk are purely the length of the cables available, and the size of the room.

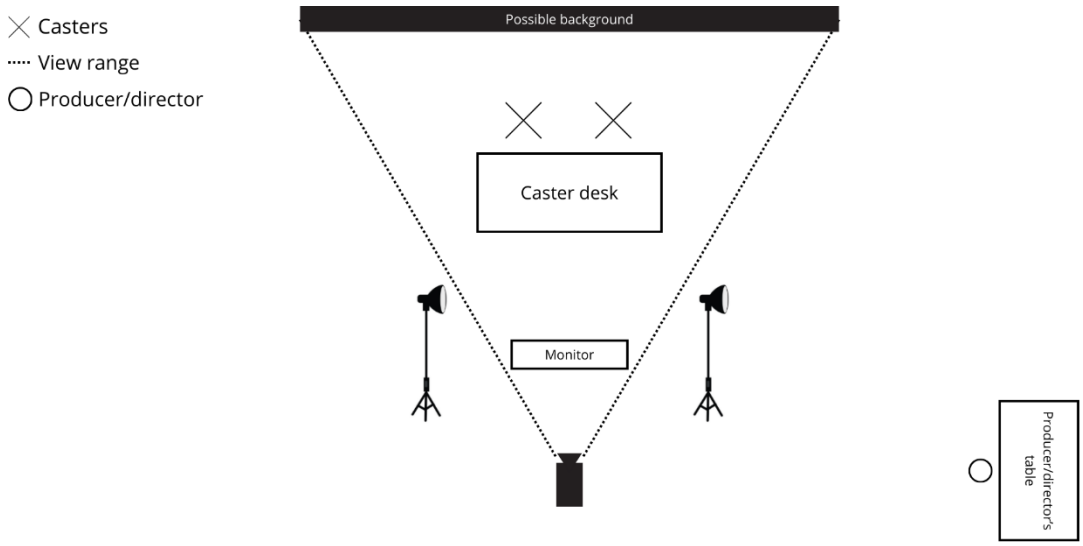

Figure 27, Example of a studio setup

6.1.2 Additional notes

When building the setup, you need to be sure that you have enough cables for building the setup. Optimally the cables in the setup are too long than just the bare minimum. Having short cables in

the setup can create many hazards, for example, if the cable for camera is too short, the camera can fall and break if somebody accidentally touches the cable. Another example is that the cables for casters headset are too short, and the headset breaks due to rapid movement during stream. A good rule is that the cables should not be tight and hang in the air.

Setting the camera also creates new things to keep in mind. While setting the camera up, you should aim it, so it doesn't show anything extra. The height of the camera matters, and it should show both casters behind the table and it should not cut out the top of their heads. Depending on the table in the setup, you should also consider does the camera show the legs of the casters. In these situations, you aim the camera to cut on the table. The table in this situation is the last thing visible in camera. This problem can also be fixed by setting a tablecloth on the table.

When building the setup, take the size of the room into consideration. The example setup in Figure 27 needs a lot of space, but it can fit in more tight environments too. When operating with a bigger space, usually the air conditioning is better, making the work environment more pleasing to stream in. It can also prevent some equipment malfunctions. Small room with bad AC can create overheating in the equipment and that way lower the quality of the stream. Good air quality helps the casters and producer stay more focused on the work and it can prevent some unwanted headaches and nausea. Selecting a room without windows can create better studio environment. The amount of external light sources that you cannot affect can create problems with the lighting in the stream.

The above-mentioned notes are only suggestions and extra for the stream. These can help with being more consistent with the content and these suggestions create better environment for the people doing the streams. After all, only the stuff that can be seen in the camera is important for the quality of the stream. Building aesthetically pleasing studio that cannot be seen in the camera is not important for the stream's quality, but it can be better for the well-being of the streamers.

6.2 Remote studio

The concept of a remote studio is very simple: build a stream structure that supports the fact that the casters are not physically in the same place. In a fast-paced and international industry of esports relies heavily on online tournaments, so is the producing of a broadcast done in often cases completely remotely. As an on-site studio relies more on the hardware available, remote studio

is a much more flexible method of creating a professional-looking broadcast. We will discuss the most important factors to focus on when setting up a remote studio.

6.2.1 Requirements

The remote studio setup really only requires three PCs with peripherals, one for the producer and two for the casters. The casters need microphones, headphones, and webcams to be able to operate on-air. The stream itself consists of all the same elements that an on-site stream would, with the difference being that the studio scene will consist of two cameras, both in their own frames ideally. For this a layout needs to be designed.

How the stream itself works, is up for the personnel operating in it, but we give out a few suggestions on how to get started. Firstly, it is important to establish a communication channel for all the people involved in the stream, for example Discord or TeamSpeak. The producer and the casters should be together in a call so that the communication is easily managed.

Next up is setting up the camera feeds from the casters to the producers PC. There are multiple different options on how this can be managed, but from our experience, VDO.ninja works the best and is free to use. The casters will select their camera and audio devices correctly, and send links to their feeds for the producer, who will then add the feeds into OBS or Streamlabs as a browser source. It is important that also the sound comes through these feeds, so that the communication channel, let's say Discord, stays clean and off stream. This way the casters can also mute themselves, should they need to do so. The producer must remember to separate the Discord audio from the system, or game sounds, so that it stays off-air. The browser sources should be put into correct scenes, such as studio and in-game. For in game, the casters cameras should be below the game picture to avoid unexpected circumstances.

7 Example Cases

In the final part of this book, we have two example cases on how to build a stream/studio setup in a live environment. The first one being from Assembly Winter 2024, which is the second biggest LAN event of the year in Finland, and the second is a LAN tournament hosted in Jyväskylä University of Applied Sciences (JAMK). These were selected as example cases due to the documentation from these events being easily accessible, and the two being tournaments with different game titles, to show as wide of a range as possible of different setups, and how they work.

7.1 Example case 1, Assembly Winter 2024

The first example case is a studio setup in a live environment. Located in Assembly Winter 2024, the tournaments produced with this setup were the eFutisliiga2024, Nordic Invitational 2024, Logitech G Creators Cup, TFT ESM, and Assymyllyt Tekken 8 tournament. The variety of different game titles played with the setup proves the versatility of this kind of a setup. Images shown in this part are mostly of the first two of the aforementioned tournaments, since they were both EAFC tournaments, and the whole setup was built to particularly for those tournaments.

This setup was a masterclass on how much can be done with just Windows PCs and OBS. Taking the stress levels to the maximum on both software and hardware, the setup was at its best producing 3 live feeds, and one feed with audio for the LAN audience. The hardware was on the edge, as we were operating on normal Windows PCs, and the network capacity proved to be an issue with so many feeds being sent simultaneously. Ultimately a success, these tournaments were not for the faint of heart to produce, since new problems were arising the moment, another got solved. A side note from this, always remember to make sure the network capacity is taken into consideration when planning an on-site stream.

7.1.1 Setup blueprint

Shown in figure 28, the layout may at first sight look a little confusing. The setup was complex from the technical side for a variety of reasons, one of which being just the pure number of cameras used for the stream. This stream setup utilized a grand total of 6 cameras, out of which 4

were player cams and one was a remote-controlled robot camera, that served as the main atmosphere camera. The robot camera was operated on a separate PC than the stream.

The player's setups consisted of a grand total of 10 PS5s and 10 PCs. Since the EAFC tournaments were played on PS5s, the player cams were plugged into the PCs and sent via Network Device Interface (NDI) system to the streaming PC. This also was taking up the bandwidth, and adding to the load, that was already weighing on the internet connection.

In a live environment placing a background for the casters can prove to be an inconvenience. For this event we chose to not place such a background, and to utilize the LAN environment as an interactive background. This is a valid option especially in an energic event such as this one.

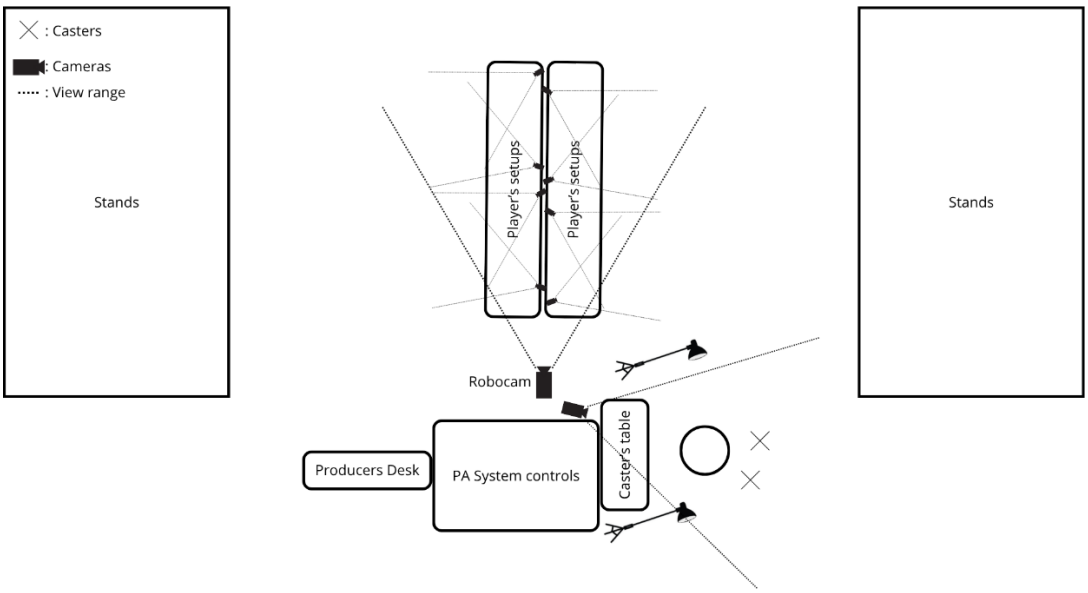

Figure 28, Blueprint of the stream setup

7.1.2 Caster POV

In figure 29, we see what was behind the caster camera. Casters have a screen from which they can observe the live feed, to keep track with what is happening. For this particular setup we utilized a bar table for a standing studio desk. As the whole setup was organized in the RedBull Sphere, a studio desk themed with their brand was an excellent decision for product placement. In figure 31, we can also see more of the same product placement in a form of a fridge in the background of the stream.

Casters use XLR connected headsets, through which they can hear both what is happening on stream, and the voice of one another. This ensures a clear communication in an environment that produces a lot of background noise. Underneath the desk the casters had a headphone amplifier, from which they could adjust the volume of their headsets, without the producer having to run to do so when required. This proved to be a small, yet effective quality of life detail.

Figure 29, Caster POV

7.1.3 Producer's desk

Seen in figure 30, the producer's desk for this event was filled with monitors of various purposes. The PC on the right with the three monitors was the stream PC, that everything in the setup was connected one way or another. Directly in front of these monitors is the audio mixer used for both the PA system in the live environment, and the casters volume on stream.

Explaining from left to right all the five monitors we see in figure 30, the first two we see are controlling and sending the camera feed from the robot camera. This PC was later utilized for sending a clean feed for other countries' streamers in the Nordic Invitational tournament. The

horizontally placed monitor in the middle was mainly used as a communications screen, running Discord, and other communication channels. Next on the right is the monitor showcasing the Multiview feature of OBS Studio. This feature allows you to select all the scenes you wish to see in real time for the entirety of the stream. This tool helps with directing the stream, as you can change the scenes by just clicking on the image. The last screen on the right is running the OBS Studio main view. On this screen all the possible changes for sources in scenes were made. The stream was mainly directed with the Multiview and StreamDeck seen below the last monitor on the right.

Figure 30, Producers desk

7.1.4 Live feed

Lastly the live feed, shown in figure 31, showcases us what the ‘studio view’ looked like to the viewers of the stream. Nothing extra is in this shot, and everything is carefully placed so that the stream looks as professional as possible. The background is live with lots of people walking around, which brings a more live aspect to the whole scene. On the left is the fridge mentioned earlier when discussing about product placement. The shot is very controlled, and the dimensions have been carefully measured so that everything unnecessary have been left out of the image.

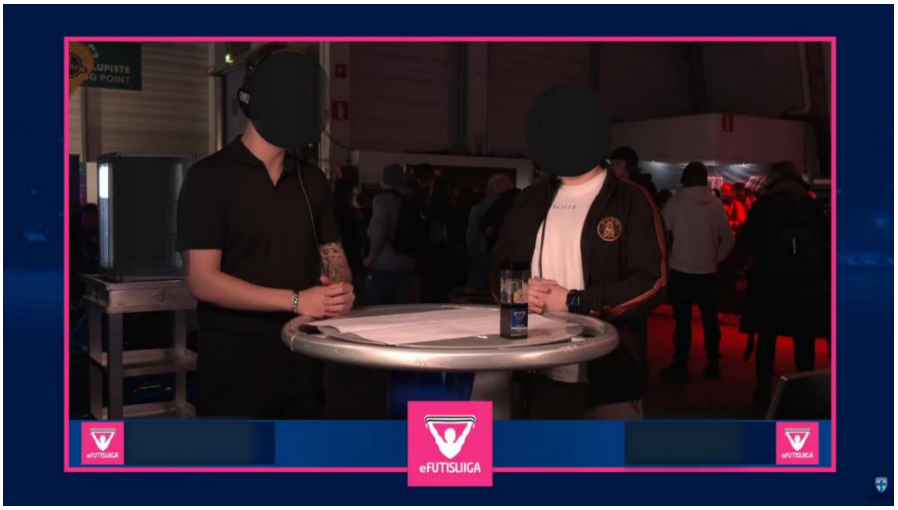

Figure 31, What the studio looks like on stream

7.2 Example case 2, ENCE Institutional Showdown 2023

The example case 2, was held in a LAN environment for ENCE school partners. The event had CS2 and VALORANT tournaments, where 3 school teams competed against each other. Games being same genre, also made the change between titles very easy. Venue for the event was Jamk Game-Pit. This location had excellent premises for the studio quality broadcast and there was a lot of different features that could be used in the broadcast.

7.2.1 Setup blueprint

As seen in the figure 32, the layout for the stream was the same as in the example setup mentioned before (figure 27). The main difference between the two are that the producer and observer were in a different room. The producing room had window towards the studio for the visual contact between the casters and the producer and observer. This setup utilized two PCs, one for the production and one for the in-game observing. Game picture was sent to the producer PC via SDI cable.

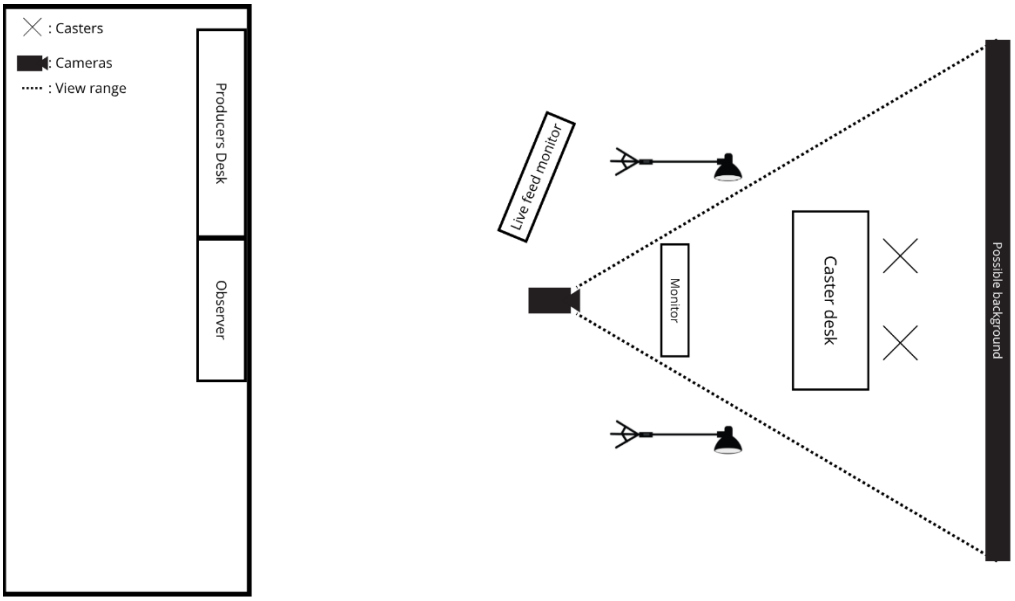

Figure 32, Blueprint of the studio setup

7.2.2 Caster POV

In this setup the casters were sitting in the studio. Both casters had their own chairs behind the casters table that can be seen in the right side of figure 33. As already mentioned, the setup and layout were the same as in example setup 6.1.1.

The casters saw the game from the gaming screen set in front of them. The screen was set as low as possible, so it doesn't show in the studio camera pointed at the casters. The bigger screen was used to show the stream feed to the casters. This way the casters were able to tell when they are in camera, on break screen or in the game screen. This helps the communication between the casters and the producer during the stream. Two studio lights in front of the casters were used, to avoid shadows behind casters.

Casters used XLR headsets for the communication between each other and for the stream. The selection of the headsets was made due to the quality of the microphones and to the headsets being easy to use for the casters.

Figure 33, Caster POV

7.2.3 Producer's desk

The figure 34 below shows the view the producer had during the event. In this view every monitor shows different things for the producer. The bottom left screen shows the OBS, where the producer can switch between scenes and add new sources for the stream. OBS also shows the audio tracks, so the producer can see and fix the issues if the sliders stop moving. The StreamDeck below the screen was also used to switch between scenes.

Middle screen was used for the studio picture. Through this screen the live feed from the studio was seen. The decision for it was made, so the producer can see the casters even, when the studio scene was not live in the stream.

Game picture was shown in the last monitor seen in the top of the figure 34. This screen was used for the same purpose as the middle monitor. Next to the StreamDeck, was the mixer. All the sounds from and for the casters went through this mixer. With the sliders on the mixer, producer was able to control the volume of the caster's microphones. The window to the studio mentioned in 7.2.1 can be seen in the right corner of the figure.

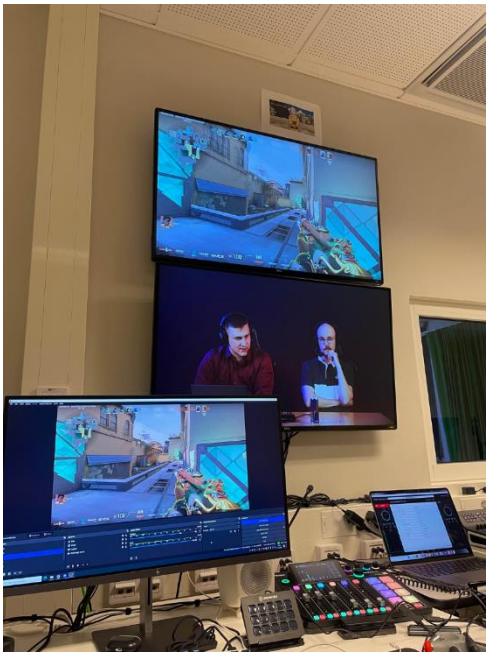

Figure 34, Producer's desk

7.2.4 Live feed

The figure 35 below shows what the studio looked like for the viewers. The view of the camera was cut to show nothing extra in the studio segments of the stream. As mentioned before, the table is a good place for product placement, and as can be seen from the figure, it was used to showcase the drinks from the sponsor of the tournament. The dark coloured curtain behind the casters was used to keep the simplicity of studio view. Coloured lights to give a bit more colour to the background were used to further enhance the look of the stream.

Figure 35, What the studio looks like on stream

8 Conclusion and Final Thoughts

As the book comes to an end, there are still a couple of topics left to discuss: Due to the field of esports and modern media production being an ever-changing and fast-paced industry, the information discussed in this book can be irrelevant depending on how much time has passed since this was written. There will surely be room for books such as this one in the future with more up to date information, as time goes on. The information in this book is applicable and relevant in the Spring of 2025, and the book will not be updated by the authors. For more up to date information, please visit the websites of your chosen streaming platform and software. The topics discussed in this work were deemed relevant by both authors, using their experience in the broadcast production industry as the base for information.

As the field of esports broadcasting and stream production is still in development, there are matters absent from this book that should be given a closer look. For example, this book offers much information for the technical side of the broadcasting work, but it does not discuss the work itself. There is a lot more that goes into producing an esports broadcast, and in the authors' professional opinion this should be further discussed. Topics such as camera work, on-air talent's work, directing, producing, and in-game observing are all roles of a professional esports broadcast. There could be a whole other book written just about the work on different parts of the broadcast, to give out ideas for possible future job prospects for students and all those interested in working in the esports and entertainment industry.

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