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2018, however, music streaming revenue exceeded that of traditional revenue streams (e.g. record sales, album sales, downloads).[61] Streaming revenue is now one of the largest driving forces behind the growth in the music industry. By August 2020, the COVID-19 pandemic had streaming services busier than ever. The pandemic contributed to a surge in subscriptions, in the UK alone, 12 million people joined a new streaming service that they had not previously had.[62] Global subscriptions skyrocketed past 1 billion.[63] Within the first 3 months, back in 2020, nearly 15.7 million people signed up for Netflix.[64] With people stuck at home and facing lock-downs Netflix and other streaming services provided a much needed distraction. An impact analysis of 2020 data by the International Confederation of Societies of Authors and Composers (CISAC) indicated that remuneration from digital streaming of music increased with a strong rise in digital royalty collection (up 16.6% to EUR 2.4 billion), but it would not compensate the overall loss of income of authors from concerts, public performance and broadcast.[65] The International Federation of the Phonographic Industry (IFPI) recompiled the music industry initiatives around the world related to the COVID-19. In its State of the Industry report, it recorded that the global recorded music market grew by 7.4% in 2022, the 6th consecutive year of growth. This growth was driven by streaming, mostly from paid subscription streaming revenues which increased by 18.5%, fueled by 443 million users of subscription accounts by the end of 2020.[66] The COVID-19 pandemic has also driven an increase in misinformation and disinformation, particularly on streaming platforms like YouTube and podcasts.[67] A TV set streaming an audio file from a local home server Streaming also refers to the offline streaming of multimedia at home. This is made possible by technologies such as DLNA, which allow devices on the same local network to connect to each other and share media.[68][69] Such capabilities are heightened using network-attached storage (NAS) devices at home, or using specialized software like Plex Media Server, Jellyfin or TwonkyMedia.[70] A broadband speed of 2 Mbit/s or more is recommended for streaming standard-definition video,[71] for example to a Roku, Apple TV, Google TV or a Sony TV Blu-ray Disc Player. 5 Mbit/s is recommended for high-definition content and 9 Mbit/s for ultra-high-definition content.[72] Streaming media storage size is calculated from the streaming bandwidth and length of the media using the following formula (for a single user and file): storage size in megabytes is equal to length (in seconds) × bit rate (in bits/s) / (8 × 1024 × 1024). For example, one hour of digital video encoded at 300 kbit/s (this was a typical broadband video in 2005 and it was usually encoded in 320 × 240 resolution) will be: (3,600 s × 300,000 bits/s) / (8 × 1024 × 1024) requires around 128 MB of storage. If the file is stored on a server for on-demand streaming and this stream is viewed by 1,000 people at the same time using a Unicast protocol, the requirement is 300 kbit/s × 1,000 = 300,000 kbit/s = 300 Mbit/s of bandwidth. This is equivalent to around 135 GB per hour. Using a multicast protocol the server sends out only a single stream that is common to all users. Therefore, such a stream would only use 300 kbit/s of server bandwidth. In 2018 video was more than 60% of data traffic worldwide and accounted for 80% of growth in data usage.[73][74] Unicast connections require multiple connections from the same streaming server even when it streams the same content. Video and audio streams are compressed to make the file size smaller. Audio coding formats include MP3, Vorbis, AAC and Opus. Video coding formats include H.264, HEVC, VP8 and VP9. Encoded audio and video streams are assembled in a container bitstream such as MP4, FLV, WebM, ASF or ISMA. The bitstream is delivered from a streaming server to a streaming client (e.g., the computer user with their Internet-connected laptop) using a transport protocol, such as Adobe's RTMP or RTP. In the 2010s, technologies such as Apple's HLS, Microsoft's Smooth Streaming, Adobe's HDS and non-proprietary formats such as MPEG-DASH emerged to enable adaptive bitrate streaming over HTTP as an alternative to using proprietary transport protocols. Often, a streaming transport protocol is used to send video from an event venue to a cloud transcoding service and content delivery network, which then uses HTTP-based transport protocols to distribute the video to individual homes and users.[75] The streaming client (the end user) may interact with the streaming server using a control protocol, such as MMS or RTSP. The quality of the interaction between servers and users is based on the workload of the streaming service; as more users attempt to access a service the quality may be affected by resource constraints in the service.[76] Deploying clusters of streaming servers is one such method where there are regional servers spread across the network, managed by a singular, central server containing copies of all the media files as well as the IP addresses of the regional servers. This central server then uses load balancing and scheduling algorithms to redirect users to nearby regional servers capable of accommodating them. This approach also allows the central server to provide streaming data to both users as well as regional servers using FTPpeer libraries if required, thus demanding the central server to have powerful data processing and immense storage capabilities. In return, workloads on the streaming backbone network are balanced and alleviated, allowing for optimal streaming quality.[77][needs update] Designing a network protocol to support streaming media raises many problems. Datagram protocols, such as the User Datagram Protocol (UDP), send the media stream as a series of small packets. This is simple and efficient; however, there is no mechanism within the protocol to guarantee delivery. It is up to the receiving application to detect loss or corruption and recover data using error correction techniques. If data is lost, the stream may suffer a dropout. The Real-Time Streaming Protocol (RTSP), Real-time Transport Protocol (RTP) and the Real-time Transport Control Protocol (RTCP) were specifically designed to stream media over networks. RTSP runs over a variety of transport protocols.[78] while the latter two are built on top of UDP. HTTP adaptive bitrate streaming is based on HTTP progressive download, but contrary to the previous approach, here the files are very small, so that they can be compared to the streaming of packets, much like the case of using RTSP and RTP.[79] Reliable protocols, such as the Transmission Control Protocol (TCP), guarantee correct delivery of each bit in the media stream. It means, however, that when there is data loss on the network, the media stream stalls while the protocol handlers detect the loss and retransmit the missing data. Clients can minimize this effect by buffering data for display. While delay due to buffering is acceptable in video-on-demand scenarios, users of interactive applications such as video conferencing will experience a loss of fidelity if the delay caused by buffering exceeds 200 ms.[80] Multicasting broadcasts the same copy of the multimedia over the entire network to a group of clients. Unicast protocols send a separate copy of the media stream from the server to each recipient. Unicast is the norm for most Internet connections but does not scale well when many users want to view the same television program concurrently. Multicast protocols were developed to reduce server and network loads resulting from the data streams that occur when many recipients receive unicast content streams independently. These protocols send a single stream from the source to a group of recipients. Depending on the network infrastructure and type, multicast transmission may or may not be feasible. One potential disadvantage of multicasting is the loss of video on demand functionality. Continuous streaming of radio or television material usually precludes the recipient's ability to control playback. However, this problem can be mitigated by elements such as caching servers, digital set-top boxes, and buffered media players. IP multicast provides a means to send a single media stream to a group of recipients on a computer network. A connection management protocol, usually Internet Group Management Protocol, is used to manage the delivery of multicast streams to the groups of recipients on a LAN. One of the challenges in deploying IP multicast is that routers and firewalls between LANs may allow the passage of packets destined to multicast groups. If the organization that is serving the content has control over the network between server and recipients (i.e., educational, government, and corporate intranets), then routing protocols such as Protocol Independent Multicast can be used to deliver stream content to multiple local area network segments. Peer-to-peer (P2P) protocols arrange for prerecorded streams to be sent between computers. This prevents the server and its network connections from becoming a bottleneck. However, it raises technical, performance, security, quality, and business issues. Content delivery networks (CDNs) use intermediate servers to distribute the load. Internet-compatible unicast delivery is used between CDN nodes and streaming destinations. Media that is livestreamed can be recorded through certain media players, such as VLC player, or through the use of a screen recorder. Live-streaming platforms such as Twitch may also incorporate a video on demand system that allows automatic recording of live broadcasts so that they can be watched later.[81] YouTube also has recordings of live broadcasts, including television shows aired on major networks. These streams have the potential to be recorded by anyone who has access to them, whether legally or otherwise.[82] Recordings can happen through any device that allows people to watch movies they do not have access to or be at a music festival they could not get tickets to. These live streaming platforms have revolutionized entertainment, creating new ways for people to interact with content. Many celebrities started live streaming during COVID-19 through platforms like Instagram, YouTube, and TikTok offering an alternate form of entertainment when concerts were postponed. Live streaming and recording allow for fans to communicate with these artists through chats and likes. Most streaming services feature a recommender system for viewing based on each user's view history in conjunction with all viewers' aggregated view histories. Rather than focusing on subjective categorization of content by content curators, there is an assumption that, with the immensity of data collected on viewing habits, the choices of those who are first to view content can be algorithmically extrapolated to the totality of the user base, with increasing probabilistic accuracy as to the likelihood of their choosing and enjoying the recommended content as more data is collected.[83] Useful and typical applications of streaming are, for example, long video lectures performed online.[84] An advantage of this presentation is that these lectures can be very long, although they can always be interrupted or repeated at arbitrary places. Streaming enables new content marketing concepts. For example, the Berlin Philharmonic Orchestra sells Internet live streams of whole concerts instead of several CDs or similar fixed media in their Digital Concert Hall[85] using YouTube for trailers. These online concerts are also spread over a lot of different places, including cinemas at various places on the globe. A similar concept is used by the Metropolitan Opera in New York. There is also a livestream from the International Space Station.[86][87] In video entertainment, video streaming platforms like Netflix, Hulu, and Disney+ are mainstream elements of the media industry.[88] Marketers have found many opportunities offered by streaming media and the platforms that offer them, especially in light of the significant increase in the use of streaming media during COVID lockdowns from 2020 onwards. While revenue and placement of traditional advertising continued to decrease, digital marketing increased by 15% in 2021, with digital media and search representing 65% of the expenditures. A case study commissioned by the WIPO[90] indicates that streaming services attract advertising budgets with the opportunities provided by interactivity and the use of data from users, resulting in personalization on a mass scale with content marketing.[91] Targeted marketing is expanding with the use of artificial intelligence, in particular programmatic advertisement, a tool that helps advertisers decide their campaign parameters and whether they are interested in buying advertising space online or not. One example of advertising space acquisition is Real-Time Bidding (RTB).[92] See also: Copyright aspects of downloading and streaming For over-the-top media service (OTT) platforms, the original content captures additional subscribers.[93] This presents copyright issues and the potential for international exploitation through streaming.[94] widespread use of standards, and metadata in digital files.[95] The WIPO has indicated several basic copyright issues arising for those pursuing work in the film[96] and music industries[97] in the era of streaming. Streaming copyrighted content can involve making infringing copies of the works in question. The recording and distribution of streamed content is also an issue for many companies that rely on revenue based on views or attendance.[98] Main article: Greenhouse gas emissions § Digital services The net greenhouse gas emissions from streaming music were estimated at between 0.2 and 0.35 million metric tons CO2eq (between 200,000 and 340,000 long tons; 220,000 and 390,000 short tons) per year in the United States, by a 2019 study.[99] This was an increase from emissions in the pre-digital music period, which were estimated at "0.14 million metric tons (140,000 long tons; 150,000 short tons) in 1977, 0.136 million (134,000 long tons; 150,000 short tons) in 1988, and 0.157 million (155,000 long tons; 173,000 short tons) in 2000." [100] However, this is far less than other everyday activities such as eating. For example greenhouse gas emissions in the United States from beef cattle (burping of ruminants only - not including their manure) were 129 million metric tons (127 million long tons; 142 million short tons) in 2019.[101] A 2021 study claimed that, based on the amount of data transmitted, one hour of streaming or videoconferencing "emits 150–1,000 grams (5–35 oz) of carbon dioxide... requires 2–12 liters (0.4–2.6 imp gal; 0.5–3.2 U.S. gal) of water and demands a land area adding up to about the size of an iPad mini." The study suggests that turning the camera off during video calls can reduce the greenhouse gas and water use footprints by 96%, and that an 86% reduction is possible by using standard definition rather than high definition when streaming content with apps such as Netflix or Hulu.[102][103] However, another study estimated a relatively low amount of 36 grams per hour (1.3 ounces per hour), and concluded that watching a Netflix video for half an hour emitted only the same amount as driving a gasoline-fuelled car for about 100 meters (330 ft), so not a significant amount.[104] One way to decrease greenhouse gas emissions associated with streaming music is to make data centers carbon neutral by converting to electricity produced from renewable sources. On an individual level, the purchase of a physical CD may be more environmentally friendly if it is to be played more than 27 times.[105][dubious - discuss] Another option for reducing energy use is downloading the music for offline listening to reduce the need for streaming over distance.[105] The Spotify service has a built-in local cache to reduce the necessity of repeating song streams.[106] Record production portal Comparison of music streaming services Comparison of streaming media software Comparison of video hosting services Content delivery platform Digital television Directive on Copyright in the Digital Single Market Internet Protocol television Geo-blocking List of streaming media services List of streaming media systems M3U playlists National Streaming Day Over-the-top media service P2PTV Protection of Broadcasts and Broadcasting Organizations Treaty Smart TV Stream ripping Video over cellular ^ Patrikakis, Charalampos; Papaoulakis, Nikos; Stefanoudaki, Chrysanthi; Nunes, Mário (2010), Daras, Petros; Ibarra, Oscar Mayora (eds.), "Streaming Content Wars: Download and Play Strikes Back", User Centric Media, vol. 40, Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 218–226, doi:10.1007/978-3-642-12630-7_26, ISBN 978-3-642-12629-1, retrieved 5 May 2024 ^ "DLNA Network Guide (PDF). 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A personalized News feed based on your Library with the latest news, events, and content updates direct from publishers and game developers. • Customizable Steam notifications: wishlist, sales, comments, trades, discussions, friend requests, and more. • Access to the entire Steam Community - discussions, groups, guides, Market, Workshop, broadcasts, and more. • Access to your friends, friend activity, groups, screenshots, inventory, wallet, and more. • Authorized Devices - Manage access to the devices your account has signed in • An improved Store browsing experience for mobile screens • Support for using multiple Steam accounts in the app • Support for customizing your app's main tabs Apr 15, 2025 Version 3.10.0 - Improvements to the Move Authenticator flow -Other minor fixes and improvements I really like a lot of the new features added in the recent overhaul, being able to redeem codes in the app itself is a huge plus! That said, it's clear this update was not made with iPads in mind, there's no support for Landscape orientation. There are major issues with the search function too, typing into the bar doesn't offer suggestions and tapping return just clears the bar without taking you into a search page. This means i cannot actually search the store within the app. Which, given that this is a storefront first and foremost, is a major problem. With those issues fixed, this is a 5-star app easy. But until then, i can only give it a 3. Please fix this soon!EDIT: landscape support has been added and makes the app much more functional but the search bar still does not work at all, this needs to be fixed asap I have a new computer that made a steam account a year ago. I bought seven games to start. Someone signed into their 10 year old account on my device and now i see over a hundred servers in tools and every game they own on MY account. They then uninstalled the two games on my computer from their account. It's like steam switched the accounts. They then deleted their 10 year account. (It's in the process of being deleted.) When I sign into my account i see all their games and tools. When they sign into their account, that's being deleted, they see only two games. mine. We can't stop steam from hijacking my computer doing whatever they want. So technically right now they are deleting my new account, and then they expect me to autoupdate over 100 game servers from the account that signed into my device. This is a disaster for anyone with cpstd from hacking abuse like me. I guess in the end i can't use steam at all because they ignore you when you're telling them what's going on. My new account is banned from participating in the community when I've never even talked to anyone because i have no friends. Thanks to steam for compromising my brand new computer and thanks for forcing me off your platform for no reason at all. To those reading this never let anyone else sign in on your computer even your sibling or they will switch the accounts and destroy your computer. And never let your mom and dad put you and your sibling on the same authentication. The STEAM application on my computer told me to download the mobile application to remove the trade/market holds. This was my first time using the STEAM market, so i thought that sounded great! It worked the moment i activated the Authenticator, allowing me to sell and trade cards. Two days later, my account suddenly has the holds again. I thought i'd simply refresh the Authenticator and it would fix it. I was horribly mistaken. Adding the Mobile Authentication to your account does NOTHING. It does NOT remove trade holds consistently and it extremely frustrating to try and understand. After authenticating for the second time, it not only didn't release my trade hold, but removed my ability to use the Community Market for 15 DAYS!! I'll forget all about my trades and badges i was crafting by then! There's no button to prove that it was you that made the trade, you just have to suffer in silence for 15 days. THIS IS AN AWFUL SYSTEM! If you're downloading this app just for the authentication, its more worth it to just buy the cards straight up or farm gems than go through sell/trade side of the Community Market. 0/10 experience. All i wanted was badges for my favorite games. P.S. Same thing happened to my friends in the past, NOT JUST ME! VALVE, FIX THIS!! we need a "i made that trade!" button! That's it! No more holding our steam for 15 days! The developer, Valve, indicated that the app's privacy practices may include handling of data as described below. For more information, see the developer's privacy policy. The following data may be collected and linked to your identity: Purchases Financial Info Contact Info User Content Search History Identifiers Usage Data Diagnostics Privacy practices may vary, for example, based on the features you use or your age. Learn More Developer Website App Support Privacy Policy