IN THE UNITED STATES DISTRICT COURT
DISTRICT OF DELAWARE

OPTIMORPHIX, INC., ***Plaintiff,*** v. **BRIGHTCOVE INC. AND BRIGHTCOVE HOLDINGS, INC.,** ***Defendants.***	Civil Action No. 1:24-cv-01133-MN **JURY TRIAL DEMANDED**

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

OptiMorphix, Inc. ("OptiMorphix" or "Plaintiff") brings this action and makes the following allegations of patent infringement relating to U.S. Patent Nos.: 9,191,664 (the "'664 Patent"); 8,621,061 (the "'061 Patent"); 7,987,285 (the "'285 Patent"); 7,991,904 (the "'904 Patent"); 8,230,105 (the "'105 Patent"); 8,255,551 (the "'551 Patent"); 8,769,141 (the "'141 Patent"); 8,775,665 (the "'665 Patent"); 9,894,361 (the "'361 Patent"); 9,749,713 (the "'713 Patent"); 8,429,169 (the "'169 Patent"); and 10,412,388 (the "'388 Patent" and collectively, the "Patents-in-Suit"). Defendants Brightcove Inc. and Brightcove Holdings, Inc. (collectively, "Brightcove" or "Defendant") infringe the Patents-in-Suit in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq*.

THE PARTIES

1. Plaintiff OptiMorphix, Inc. ("Plaintiff" or "OptiMorphix") is a Delaware corporation that holds a portfolio of over 250 patent assets that were developed at Citrix Systems, Inc. ("Citrix") and Bytemobile, Inc.

2. Bytemobile, Inc. ("Bytemobile") was a global leader in mobile internet solutions for network operators. The company was founded in 2000. Bytemobile's mission was to optimize

video and web content services for mobile network operators to improve users' experiences while maximizing the efficiency of network infrastructure.

3. Bytemobile was established during a time when the mobile landscape was evolving rapidly. The advent of 3G technology, coupled with increasingly sophisticated smartphones, led to a surge in demand for data services. However, mobile networks at the time were not optimized to handle this influx, particularly for data-rich services like video streaming. Recognizing this opportunity, Bytemobile sought to create solutions that would enable network operators to deliver high-quality, consistent mobile data services. By 2011, Bytemobile was a "market leader in video and web optimization, with more than 125 cumulative operator deployments in 60 countries.[1]

The New York Times

VODAFONE IN DEAL WITH START-UP Bytemobile, a wireless data start-up based in Mountain View, Calif., said yesterday that it reached a deal with Vodafone, Britain's largest mobile phone operator, to provide technology that improves the performance

Vodafone
215 euros a share
214
213
212

NTT DoCoMo Launches Bytemobile Optimization Solution in its Core Network

WirelessWatch JP - October 5, 2004

Bytemobile, the company dedicated to deli access to network operators, service prov today announced that NTT DoCoMo has optimization solution in its core network to access and more cost efficient delivery of a browsing and email. "The sheer volume of underscores the fact that NTT DoCoMo leads data services that offer a great end-user e Livingston, executive vice president for Byter

China Mobile Selects Bytemobile for Nationwide Web Gateway Project

2009-07-08 16:20

World's Largest Wireless Network Operator to Deliver Mobile Inter Adaptation Solution

MOUNTAIN VIEW, Bytemobile, Inc., t

ByteMobile Wins 2013 LTE Award for Best LTE Traffic Management Product

T3100 Adaptive Traffic Manager Distinguished for Facilitating Effective LTE Deployments

July 01, 2013

SANTA CLARA, Calif.--(BUSINESS WIRE)--Today, Citrix ByteMobile announced the T3100 Adaptive Traffic Manager has been named the winner of the 2013 LTE Award for Best LTE Traffic Management ma and telecoms.com. The Citrix ffic Manager was recognized with this the critical role it plays in LTE

Bytemobile Juices Up Orange

MOUNTAIN VIEW, Calif. -- Bytemobile, the company dedicated to accelerating the growth of the wireless data market through significantly improving the user experience and operator efficiency, today announced that it has signed a software licensing and support services agreement which will see Orange UK use its Macara platform. The Macara platform, an optimisation service node (OSN), further increases the speed of Orange's GPRS services, significantly enhancing Internet access performance for customers. "At Orange, we are seeking the best performance and services for our customers, and the Macara

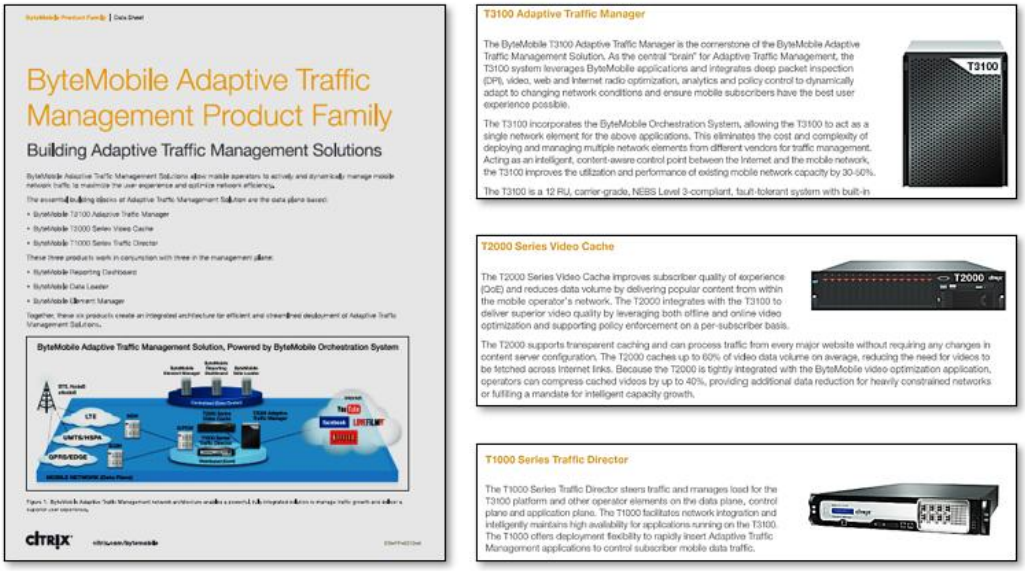
Andrew Zipern, *Vodafone in Deal with Start-Up Bytemobile*, NYTIMES at C4 (January 29, 2002) ("Bytemobile, a wireless data start-up . . . reached a deal with Vodafone, Britain's largest mobile phone operator"); *NTT DoCoMo Launches Bytemobile Optimization Solution in its Core Network*, WIRELESSWATCH IP (October 5, 2004) ("NTT DoCoMo has deployed Bytemobile's optimization solution in its core network"); *China Mobile Selects Bytemobile for Nationwide Web Gateway*

[1] *Bytemobile: Importance of Video and Web Optimizations*, TELECOM REVIEW at 58 (2011); *see also Bytemobile Secures Its 36th Video Optimisation Win for MNO Deployment*, TOTAL TELECOM & TOTAL TELECOM MAGAZINE (March 21, 2011).

Project, BUSINESS WIRE (July 8, 2009) ("A Bytemobile customer since 2004, CMCC has deployed its web optimization solutions"); *Bytemobile Juices Up Orange*, ESPICOM TELECOMMUNICATION NEWS (October 10, 2002) ("Orange customers will experience faster application performance and Web page downloads"); *ByteMobile Wins 2013 LTE Award for Best LTE Traffic Management Product*, MARKETSCREENER (July 1, 2013) ("ByteMobile technology has been deployed . . . in networks serving nearly two billion subscribers.").

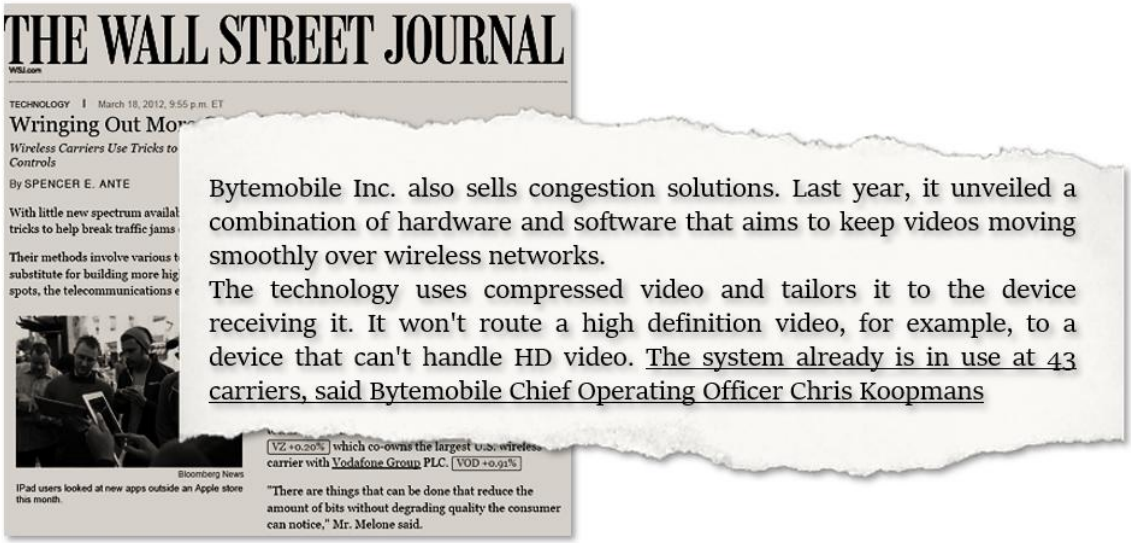
4. Bytemobile products, such as the Unison platform and the T3100 Adaptive Traffic Manager, were designed to optimize mobile data traffic in real-time, ensuring a high-quality mobile internet experience for end-users. This approach was groundbreaking at the time and set the stage for many of the mobile data optimization techniques used today.

5. Bytemobile's innovative technologies and customer-centric approach led to rapid growth and success. Bytemobile's innovative product portfolio included: the T3100 Adaptive Traffic Manager which was designed to handle high volumes of traffic efficiently and provide real-time optimization, compression, and management of mobile data; Bytemobile's T2000 Series Video Cache, which supported transparent caching of content; and Bytemobile's T1000 Series Traffic Director, which enabled traffic steering and load balancing for high availability of applications.



Bytemobile Adaptive Traffic Management Product Family, BYTEMOBILE DATA SHEET at 1-2 (2014).

6. Bytemobile's groundbreaking technologies also included products for data optimization. Bytemobile's data optimization solutions were designed to compress and accelerate data transfer. By reducing the size of data packets without compromising quality, these technologies allowed faster data transmission and minimized network congestion. Bytemobile also offered solutions to analyze and manage network traffic, allowing network operators to identify patterns, allocate bandwidth intelligently, and prioritize different types of content.



THE WALL STREET JOURNAL

WSJ.com

TECHNOLOGY | March 18, 2012, 9:55 p.m. ET

Wringing Out Mor

Wireless Carriers Use Tricks to
Controls

By SPENCER E. ANTE

With little new spectrum availal
tricks to help break traffic jams

Their methods involve various t
substitute for building more hig
spots, the telecommunications e

Bloomberg News

IPad users looked at new apps outside an Apple store this month.

Bytemobile Inc. also sells congestion solutions. Last year, it unveiled a combination of hardware and software that aims to keep videos moving smoothly over wireless networks.

The technology uses compressed video and tailors it to the device receiving it. It won't route a high definition video, for example, to a device that can't handle HD video. The system already is in use at 43 carriers, said Bytemobile Chief Operating Officer Chris Koopmans

VZ +0.26% which co-owns the largest U.S. wireless carrier with Vodafone Group PLC. VOD +0.91%

"There are things that can be done that reduce the amount of bits without degrading quality the consumer can notice," Mr. Melone said.

Spencer E. Ante, *Wringing Out More Capacity*, WALL STREET JOURNAL at B3 (March 19, 2012) (emphasis added).

7. In July 2012, Bytemobile was acquired by Citrix Systems, Inc. ("Citrix") for $435 million. Bytemobile "became part of [Citrix's] Enterprise division and extend[ed] [Citrix's] industry reach into the mobile and cloud markets."[2]

8. OptiMorphix owns a portfolio of patents developed at Bytemobile and later Citrix. Highlighting the importance of the Patents-in-Suit is the fact that the OptiMorphix's patent portfolio has been cited by over 4,800 U.S. and international patents and patent applications

[2] CITRIX SYSTEMS, INC. 2012 ANNUAL REPORT at 33 (2013).

assigned to a wide variety of the largest companies operating in the networking, content delivery, and cloud computing fields. OptiMorphix's patents have been cited by companies such as:

- Amazon.com, Inc. (263 citing patents and applications)[3]
- Oracle (59 citing patents and applications)[4]
- Alphabet, Inc. (103 citing patents and applications)[5]
- Broadcom Ltd. (93 citing patents and applications)[6]
- Cisco Systems, Inc. (277 citing patents and applications)[7]
- Lumen Technologies, Inc. (77 citing patents and applications)[8]
- Intel Corporation (45 citing patents and applications)[9]
- Microsoft Corporation (150 citing patents and applications)[10]
- AT&T, Inc. (93 citing patents and applications)[11]
- Verizon Communications, Inc. (31 citing patents and applications)[12]
- Juniper Networks, Inc. (29 citing patents and applications)[13]

9. Defendants Brightcove Inc. and Brightcove Holdings, Inc. are Delaware corporations with their principal place of business at 281 Summer Street, Boston, Massachusetts 02210. Defendants reside in this judicial District because they are incorporated in Delaware. Defendants may be served with process through their registered agent for service of process in Delaware at The Corporation Trust Company, located at Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware 19801.

[3] *See e.g.*, U.S. Patent Nos. 7,817,563; 9,384,204; 9,462,019; 11,343,551; and 11,394,620.
[4] *See e.g.*, U.S. Patent Nos. 7,475,402; 7,574,710; 8,589,610; 8,635,185; and 11,200,240.
[5] *See e.g.*, U.S. Patent Nos. 7,743,003; 8,458,327; 9,166,864; 9,665,617; and 10,733,376.
[6] *See e.g.*, U.S. Patent Nos. 7,636,323; 8,448,214; 9,083,986; 9,357,269; and 10,091,528.
[7] *See e.g.*, U.S. Patent Nos. 7,656,800; 7,930,734; 8,339,954; 9,350,822; and 10,284,484.
[8] *See e.g.*, U.S. Patent Nos. 7,519,353; 8,315,179; 8,989,002; 10,511,533; and 11,233,740.
[9] *See e.g.*, U.S. Patent Nos. 7,394,809; 7,408,932; 9,515,942; 9,923,821; and 10,644,961.
[10] *See e.g.*, U.S. Patent Nos. 8,248,944; 9,071,841; 9,852,118; 10,452,748; and 11,055,47.
[11] *See e.g.*, U.S. Patent Nos. 8,065,374; 8,429,302; 9,558,293; 9,800,638; and 10,491,645.
[12] *See e.g.*, U.S. Patent Nos. 8,149,706; 8,930,559; 9,253,231; 10,003,697; and 10,193,942.
[13] *See e.g.*, U.S. Patent Nos. 8,112,800; 8,509,071; 8,948,174; 9,407,726; and 11,228,631.

JURISDICTION AND VENUE

10. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

11. This Court has personal jurisdiction over Brightcove in this action because Brightcove has committed acts within the State of Delaware giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Brightcove would not offend traditional notions of fair play and substantial justice. Defendant Brightcove, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the Patents-in-Suit. Moreover, Brightcove actively directs its activities to customers located in the State of Delaware.

12. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Defendant Brightcove is organized and exists under the laws of the State of Delaware.

13. This Court has personal jurisdiction over Brightcove because it is organized under the laws of the State of Delaware, and it maintains a registered agent in Delaware.

THE ASSERTED PATENTS

U.S. PATENT NO. 9,191,664

14. U.S. Patent No. 9,191,664 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on November 11, 2013. The '664 Patent claims priority to U.S. Provisional patent Application No. 60/948,917, which was filed on July 10, 2007. A true and correct copy of the '664 Patent is attached hereto as Exhibit 1.

15. The '664 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '664 Patent.

16. The ‘664 Patent is generally directed to adaptive bitrate management for streaming media over packet networks. Specifically, it aims to solve the problem of delivering multimedia content over capacity-limited, shared wireless links. Challenges like sudden bandwidth fluctuations, packet loss, reduction in effective capacity, and limited total bitrate budgets make consistent high-quality streaming difficult over wireless networks. Further, the ‘664 Patent teaches ways to quickly respond to changes in network conditions by adjusting the bitrate and the media encoding scheme to optimize the viewing and listening experience of the user. It addresses the issue of transferring a fixed bitrate over a connection that cannot provide the necessary throughput, which can lead to undesirable effects such as network buffer overflow, packet loss, and media player buffer underflow.

17. The prior art has several shortcomings that the ‘664 Patent identifies. Specifically, existing protocols for rate control in media streaming over packet networks were not fully equipped to handle the challenges posed by wireless networks. These challenges include sudden adjustments of nominal transmission rate, packet loss, reduction of effective bandwidth, and limited capacity.

18. To address these issues, the ‘664 Patent teaches in one embodiment an adaptive bitrate manager that monitors feedback information to estimate network conditions. The media is encoded according to the optimal bitrates and provided as encoded streams for transmission.

19. Several benefits and improvements to computer network functionality are provided by the inventions disclosed in the ‘664 Patent. Quickly responding to changes in available network bandwidth allows maintaining consistent streaming quality. Encoding audio and video based on network estimations optimizes the media performance within constrained wireless capacity. Avoiding underflows and overflows through bitrate adaptation enables stable streaming.

20. The ‘664 Patent solves technical problems rooted in streaming multimedia over wireless networks. Challenges like packet loss and volatile transmission rates present discrete technological issues. The ‘664 Patent teaches specific techniques for dynamic adaptation of media encoding in response to feedback-based network estimates. This constitutes an improvement to computer network technology by addressing these streaming challenges.

21. The ‘664 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘664 Patent family as relevant prior art:

- Alphabet Inc.
- Oracle Corporation
- AT&T Inc.
- Telefonaktiebolaget LM Ericsson
- International Business Machines Corp.
- Microsoft Corporation
- Cisco Systems, Inc.
- DISH Network Corp.
- Broadcom Limited
- Amazon.com, Inc.
- Adobe Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Technicolor S.A.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Hitachi, Ltd.
- Verizon Communications Inc.

U.S. PATENT NO. 8,621,061

22. U.S. Patent No. 8,621,061 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 24, 2012. The ‘061 Patent claims priority to U.S.

Provisional Application No. 60/948,917, which was filed July 10, 2007. A true and correct copy of the ‘061 Patent is attached hereto as Exhibit 2.

23. The ‘061 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘061 Patent.

24. The ‘061 Patent is directed to the technological area of digital communications, specifically focusing on the transmission of digital information over packet networks.

25. The ‘061 Patent discloses methods and systems for managing the bitrate of streaming media over packet networks. One of embodiments disclosed by the ‘061 Patent teaches determining an optimal bitrate for streaming media data based on various factors such as network conditions, the type of media data, and the capabilities of the receiving device. The methods and systems then adjust the bitrate of the media data to the determined optimal bitrate.

26. The ‘061 Patent discloses a significant technological improvement to the existing technology of media streaming over packet networks. By managing the bitrate adaptively based on various factors and feedback from the receiving device, the invention allows for more efficient use of network resources and a better streaming experience for the user.

27. The ‘061 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘061 Patent family as relevant prior art:

- Alphabet Inc.
- Oracle Corporation
- AT&T Inc.
- Telefonaktiebolaget LM Ericsson
- International Business Machines Corp.
- Microsoft Corporation
- Cisco Systems, Inc.
- DISH Network Corp.
- Broadcom Limited
- Amazon.com, Inc.

- Adobe Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Technicolor S.A.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Hitachi, Ltd.
- Verizon Communications Inc.

U.S. PATENT NO. 7,987,285

28. U.S. Patent No. 7,987,285 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 9, 2008. The '285 Patent claims priority to U.S. Provisional Application No. 60/948,917, which was filed on July 10, 2007. The '285 Patent is subject to a 35 U.S.C. § 154(b) term extension of 105 days. A true and correct copy of the '285 Patent is attached hereto as Exhibit 3.

29. The '285 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '285 Patent.

30. The '285 Patent relates to adaptive bitrate management for streaming media over packet networks. It teaches a method that includes receiving a receiver report from a terminal, estimating network conditions of a media network based on the receiver report, determining an optimal session bitrate based on the estimated network conditions, and providing media data to the terminal based on the optimal session bitrate.

31. The '285 Patent is directed to solving the problem of delivering bandwidth-intensive content like multimedia over capacity-limited, shared links, particularly in wireless networks. The challenge is to quickly respond to changes in network conditions by adjusting the bitrate and media encoding scheme to optimize the user's viewing and listening experience. This

includes addressing issues like network buffer overflow, packet loss, playback stall, sudden adjustment of nominal transmission rate, packet loss due to link transmission errors or network congestion, reduction of effective bandwidth, and limited capacity in wireless networks.

32. The ‘285 Patent identifies the shortcomings of the prior art. Specifically, existing rate control protocols and recommendations were insufficient for delivering multimedia sessions over wireless networks. Issues included sudden adjustments in nominal transmission rates, packet loss, reduction of effective bandwidth, limited capacity, infrequent and incomplete network state information, handling different media streams separately, and low bitrates available for wireless multimedia sessions. These challenges made it difficult to set up a consistent streaming media session.

33. The inventions disclosed in the ‘285 Patent provide significant benefits and improvements to the function by enabling more efficient and responsive control over the bitrate of streaming media sessions according to instantaneous network capacity. This leads to better user experience in streaming media over wireless packet networks, minimizing issues like buffer overflow, packet loss, and playback stall. The adaptive bitrate management system can work with existing media players and networks, providing a more robust and flexible solution for streaming media, especially in challenging wireless environments.

34. The inventions disclosed in the ‘285 Patent solve discrete, technological problems associated with computer systems, particularly in the context of streaming media over packet networks. These problems include managing bitrate in fluctuating network conditions, handling different types of media streams, optimizing the viewing and listening experience, and addressing specific challenges in wireless networks such as interference, fading, link transmission errors, network congestion, and limited capacity. The patent provides technical solutions through

adaptive bitrate management, network state estimation, control algorithms, and specific encoding and packetization methods.

35. The ‘285 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘285 Patent family as relevant prior art:

- Alphabet Inc.
- Cisco Systems, Inc.
- Nokia Corporation
- Tencent Holdings Ltd.
- Hitachi Ltd.
- Oracle Corporation
- Microsoft Corporation
- DISH Network Corp.
- Broadcom Limited
- Amazon.com, Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Verizon Communications Inc.

U.S. PATENT NO. 7,991,904

36. U.S. Patent No. 7,991,904 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on March 31, 2009. The ‘904 Patent claims priority to U.S. Provisional Patent Application No. 60/948,917, which was filed on July 10, 2007. The ‘904 Patent is subject to a 35 U.S.C. § 154(b) term extension of 39 days. A true and correct copy of the ‘904 Patent is attached hereto as Exhibit 4.

37. The ‘904 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘904 Patent.

38. The ‘904 Patent relates to adaptive bitrate management for streaming media over packet networks. The patent includes a comprehensive framework for adjusting the bitrate of streaming media sessions according to instantaneous network capacity, particularly in wireless packet networks.

39. The ‘904 Patent is directed to solving the problem of rate control for media streaming over packet networks, particularly in wireless environments. The challenge lies in delivering bandwidth-intensive content like multimedia over capacity-limited, shared links and quickly responding to changes in network conditions. The patent addresses issues such as network buffer overflow, packet loss, playback stall, and challenges in implementing bitrate management for pseudo-streaming.

40. The ‘904 Patent identifies the shortcomings of the prior art. Specifically, existing mechanisms for multimedia transport over packet networks, such as streaming protocols (e.g., RTP) and pseudo-streaming (e.g., TCP), had limitations. For example, TCP’s acknowledgment packets are unaware of the media time being transferred, making it difficult to implement a bitrate management algorithm for pseudo-streaming. The prior art also lacked efficient solutions for challenges encountered in delivering multimedia sessions over packet wireless networks, such as sudden adjustments in transmission rate, packet loss, reduction of effective bandwidth, and limited capacity.

41. The inventions disclosed in the ‘904 Patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling adaptive bitrate management for streaming media. This allows for more efficient utilization of network resources, minimizes issues like buffer overflow and packet loss, and enhances the user experience by optimizing the viewing and listening experience. The patent’s approach to adaptive bitrate

management can be applied to various media transports and provides a comprehensive framework for delivering streaming media over wireless packet networks, particularly in fluctuating network conditions.

42. The '904 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '904 Patent family as relevant prior art:

- Oracle Corporation
- Microsoft Corporation
- Comcast Corporation
- Alphabet Inc.
- International Business Machines Corp.
- Hitachi, Ltd.
- Electronics And Telecommunications Research Institute
- EchoStar Technologies LLC
- Amazon Technologies, Inc.
- Samsung Electronics Co., Ltd.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Verizon Communications Inc.
- Broadcom Limited

U.S. PATENT NO. 8,230,105

43. U.S. Patent No. 8,230,105 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 25, 2011. The '105 Patent is a continuation of U.S. Patent Application No. 12/170,347, which was filed July 9, 2008 and issued as U.S. Patent No. 7,987,285, and which claims the benefit of U.S. Provisional Application No. 60/948,917, which was filed July 10, 2007. A true and correct copy of the '105 Patent is attached hereto as Exhibit 5.

44. The '105 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '105 Patent.

45. The ‘105 Patent relates to a method for adaptive bitrate management in streaming media over packet networks. It discloses receiving a receiver report from a terminal, estimating network conditions based on the report, determining an optimal session bitrate according to the estimated network conditions, and providing media data to the terminal based on the optimal session bitrate. The patent emphasizes the need for rate control in delivering bandwidth-intensive content like multimedia over capacity-limited, shared links, and the challenges faced in wireless networks.

46. The ‘105 Patent is directed to solving the problem of delivering consistent and optimized streaming media sessions over packet networks, particularly in wireless networks. The challenges include sudden adjustments in nominal transmission rates, packet loss, reduction of effective bandwidth, limited capacity, and difficulties in setting up a consistent streaming media session.

47. The ‘105 Patent identifies the shortcomings of the prior art. Specifically, existing protocols and methods were inadequate in handling network buffer overflow, playback stall, interference, fading, and other challenges in wireless networks. The existing solutions were not efficient in responding to changes in network conditions, and the typical wireless media player support was limited and sporadic, leading to difficulties in providing a good streaming experience.

48. The ‘105 Patent teaches the use of adaptive bitrate management, which includes an adaptive bitrate controller and a variable bitrate encoder. This framework enables the delivery of self-adjusting streaming sessions to media players, such as standard 3GPP-compliant media players. It adjusts the bitrate according to instantaneous network capacity, optimizes performance by adjusting the streaming media bitrate, and implements joint session bitrate management for audio, video, and other streams simultaneously.

49. The inventions disclosed in the ‘105 Patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling more efficient and adaptive control of streaming media sessions. By dynamically adjusting the bitrate according to network conditions, the invention minimizes issues like buffer overflow, packet loss, and playback stall. It enhances the user’s viewing and listening experience, particularly in wireless networks where traditional methods were inadequate.

50. The inventions taught by the ‘105 Patent solves discrete, technological problems associated with computer systems and networks, particularly in the context of streaming media over packet networks. These problems include network buffer management, bitrate optimization, handling of packet loss, and adjustments to sudden changes in network conditions. The invention addresses these technical challenges through a comprehensive framework that adapts to the network’s instantaneous capacity, ensuring a consistent and optimized streaming experience.

51. The ‘105 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘105 Patent family as relevant prior art:

- Amazon.com, Inc.
- Hulu LLC
- Tencent Holdings Ltd.
- Cisco Systems, Inc.
- Oracle Corporation
- Microsoft Corporation
- Comcast Corporation
- Alphabet Inc.
- International Business Machines Corp.
- Hitachi, Ltd.
- Electronics And Telecommunications Research Institute
- EchoStar Technologies LLC
- Samsung Electronics Co., Ltd.
- Qualcomm, Inc.
- CommScope, Inc.

- Intel Corporation
- Meta Platforms, Inc.
- Verizon Communications Inc.
- Broadcom Limited

U.S. PATENT NO. 8,255,551

52. U.S. Patent No. 8,255,551 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 29, 2011. The '551 Patent is a continuation of U.S. Patent Application No. 12/416,085, which was filed March 31, 2009 and issued as U.S. Patent No. 7,991,904, and which is a continuation-in-part of U.S. Patent Application No. 12/170,347, which was filed July 9, 2008 and issued as U.S. Patent No. 7,987,285, which claims the benefit of U.S. Provisional Application No. 60/948,917 filed July 10, 2007. A true and correct copy of the '551 Patent is attached hereto as Exhibit 6.

53. The '551 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '551 Patent.

54. The '551 Patent pertains to adaptive bitrate management for streaming media over packet networks. It discloses a method that includes providing pseudo-streaming media data to a terminal, receiving a TCP acknowledgment, estimating network conditions based on the acknowledgment, determining an optimal session bitrate, and providing pseudo-streaming media data based on this optimal bitrate. The patent describes mechanisms for adjusting the bitrate of streaming media according to instantaneous network capacity, which is essential for delivering bandwidth-intensive content like multimedia over capacity-limited, shared links.

55. The '551 Patent is directed to solving the problem of rate control for media streaming over packet networks, particularly in wireless environments. The challenge lies in quickly responding to changes in network conditions by adjusting the bitrate and media encoding

scheme to optimize the user's viewing and listening experience. This includes addressing issues such as network buffer overflow, packet loss, playback stall, and the challenges encountered in delivering multimedia sessions over packet wireless networks.

56. The '551 Patent identifies the shortcomings of the prior art. Specifically, traditional methods of rate control in packet networks are inadequate for handling the complexities of multimedia streaming. The prior art also lacks efficient adaptive bitrate management for wireless mobile phones, with challenges such as infrequent and incomplete network state information, separate handling of different media streams, and low media bitrates.

57. The inventions disclosed in the '551 Patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling precise control over the bitrate of streaming media. This leads to an optimized user experience by minimizing issues like buffer overflow, packet loss, and playback stall. The adaptive bitrate management framework allows for joint session bitrate management for audio, video, and other streams simultaneously, and can be applied to all media transports that provide transmission progress report mechanisms. It also offers solutions tailored to the challenges of wireless networks, enhancing the quality of multimedia streaming in mobile environments.

58. The '551 Patent addresses challenges and limitations specific to packet networks, particularly in the context of streaming media. For example, packet networks are often subject to rapid fluctuations in bandwidth and latency. These fluctuations can be caused by various factors such as interference, signal strength, user mobility, and network congestion. The '551 Patent's adaptive bitrate management system is designed to continuously monitor network conditions and adjust the streaming bitrate accordingly, ensuring a consistent user experience despite these fluctuations.

59. The ‘551 Patent addresses the inherent challenges and limitations of packet networks by providing a technological solution to handover challenges and Qualify of Service (QoS) management. Specifically, as mobile devices move between different wireless access points or network types, seamless handover is essential to maintain an uninterrupted streaming experience. The technologies taught in the ‘551 Patent are designed to handle these transitions smoothly, adapting to the new network conditions without disrupting the media playback. Further, ensuring QoS in wireless networks is complex due to the shared and unpredictable nature of the medium. The ‘551 Patent discloses technology to manage the QoS by dynamically adjusting the bitrate and encoding scheme based on real-time network conditions, ensuring that the desired level of service is maintained.

60. The ‘551 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘551 Patent family as relevant prior art:

- Alphabet Inc.
- Oracle Corporation
- AT&T Inc.
- Telefonaktiebolaget LM Ericsson
- International Business Machines Corp.
- Microsoft Corporation
- Cisco Systems, Inc.
- DISH Network Corp.
- Broadcom Limited
- Amazon.com, Inc.
- Adobe Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Technicolor S.A.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.

- Hitachi, Ltd.
- Verizon Communications Inc.

U.S. PATENT NO. 8,769,141

61. U.S. Patent No. 8,769,141 entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on March 14, 2013. The '141 Patent is a continuation of U.S. Application Ser. No. 13/183,317, which was filed July 14, 2011 and issued as U.S. Patent No. 8,255,551, which is a continuation of U.S. Patent Application No. 12/416,085, which was filed March 31, 2009 and issued as U.S. Patent No. 7,991,904, which is a continuation-in-part of U.S. Patent Application No. 12/170,347, which was filed July 9, 2008 and issued as U.S. Patent. No. 7,987,285, which claims the benefit of U.S. Provisional Application No. 60/948,917, which was filed July 10, 2007. A true and correct copy of the '141 Patent is attached hereto as Exhibit 7.

62. The '141 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '141 Patent.

63. The '141 Patent discloses a method for adaptive bitrate management in streaming media over packet networks. It includes providing pseudo-streaming media data to a terminal, receiving a TCP acknowledgment, estimating network conditions based on the acknowledgment, determining an optimal session bitrate, and providing pseudo-streaming media data based on the optimal bitrate. The patent encompasses a comprehensive framework that enables the delivery of self-adjusting streaming or pseudo-streaming sessions to media players, such as standard 3GPP-compliant media players or Flash plugins used for web-embedded video.

64. The '141 Patent is directed to solving the problem of rate control for media streaming over packet networks, particularly in bandwidth-limited and shared links. The challenge is to quickly respond to changes in network conditions by adjusting the bitrate and media encoding scheme to optimize the user's viewing and listening experience. The patent addresses issues like

network buffer overflow, packet loss, playback stall, and the challenges encountered in delivering multimedia sessions over packet wireless networks.

65. The inventions disclosed in the '141 Patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling adaptive bitrate management. This ensures optimal user experience by dynamically adjusting the bitrate according to network conditions. It minimizes undesirable effects like packet loss, buffer overflow, and playback stall. The system's ability to implement joint session bitrate management for audio, video, and other streams simultaneously, and its applicability to all media transports that provide transmission progress report mechanisms, make it a versatile solution.

66. The '141 Patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '141 Patent family as relevant prior art:

- Alphabet Inc.
- Oracle Corporation
- AT&T Inc.
- Telefonaktiebolaget LM Ericsson
- International Business Machines Corp.
- Microsoft Corporation
- Cisco Systems, Inc.
- DISH Network Corp.
- Broadcom Limited
- Amazon.com, Inc.
- Adobe Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Technicolor S.A.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Hitachi, Ltd.
- Verizon Communications Inc.

U.S. PATENT NO. 8,775,665

67. U.S. Patent No. 8,775,665 entitled, *Method for Controlling Download Rate of Real-Time Streaming as Needed by Media Player*, was filed on February 9, 2009. The '665 Patent claims priority to U.S. Patent Application No. 12/368,260, which was filed on February 9, 2009. The '665 Patent is subject to a 35 U.S.C. § 154(b) term extension of 351 days. A true and correct copy of the '665 Patent is attached hereto as Exhibit 8.

68. The '665 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '665 Patent.

69. The '665 Patent pertains to a method for controlling the download rate of real-time streaming media. It discloses receiving streaming media, retrieving timing information corresponding to the real-time playback rate on the media player, framing the streaming media based on this playback rate, scheduling the transmission of the framed streaming media, and transmitting it according to the schedule.

70. The '665 Patent is directed to solving the problem of uncontrolled downloading of large media files over limited-capacity, time-variable, shared network links, such as wireless cellular connections. Traditional progressive downloads can lead to network congestion and disrupt other users and applications. The '665 Patent addresses the need to control the download rate to match the real-time playback rate on a media player, reducing data bursts and making more efficient use of network resources.

71. The '665 Patent identifies the shortcomings of the prior art. Specifically, progressive download (PD) or pseudo-streaming (PS) is effective over high-capacity networks like wired internet but failed in limited-capacity, shared network links. The assumption that the network connection can always be faster than the bitrate of the media file being downloaded leads

to problems like network congestion and uncontrolled downloading of large files, affecting other users sharing network infrastructure.

72. The ‘665 Patent teaches the use of a method and system that controls the download rate of real-time streaming according to the playback rate on the media player. It includes parsing the streaming media to retrieve timing information, framing the media based on this timing, and scheduling the transmission accordingly. This approach spreads the download of media data over time, reducing peaks of bandwidth consumption, and allows network operators to accommodate more users with less capacity, thus solving the problem of network congestion and uncontrolled downloading.

73. The inventions taught by the ‘665 Patent solve discrete, technological problems associated with computer systems, such as network congestion, inefficient bandwidth utilization, and disruption to other users and applications due to uncontrolled downloading of large media files. These problems are inherently technical as they relate to the functioning, optimization, and management of computer networks, particularly in the context of real-time media streaming over limited-capacity and shared network links.

74. The ‘665 Patent addresses several challenges and limitations inherent to packet networks, particularly in the context of real-time media streaming. Specifically, in traditional progressive download methods, media files are downloaded as quickly as possible, leading to data bursts. In a shared wireless network, these bursts can cause congestion, affecting other users and applications. The ‘665 Patent addresses this by spreading the download of media data over time, reducing peaks in bandwidth consumption.

75. The ‘665 Patent family has been cited by 67 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘665 Patent family as relevant prior art:

- Alphabet Inc.
- China Telecom Corporation Limited
- Deutsche Telekom Ag
- Dish Network Corp.
- Hewlett Packard Enterprise Company
- Interdigital, Inc.
- Lattice Semiconductor
- Lenovo Group Limited
- Microsoft Corporation
- Netflix, Inc.
- Qualcomm, Inc.
- Rambus Inc.
- Samsung Electronics Co., Ltd.
- Sumitomo Electric Industries, Ltd.
- Technicolor S.a.
- Tencent Holdings Ltd
- Ubistar Co., Ltd.

U.S. PATENT NO. 9,894,361

76. U.S. Patent No. 9,894,361 entitled, *Framework for Quality-Aware Video Optimization*, was filed on March 31, 2010. The ‘361 Patent claims priority to U.S. Provisional Application No. 61/165,224, which was filed on March 31, 2009. The ‘361 Patent is subject to a 35 U.S.C. § 154(b) term extension of 1,038 days. A true and correct copy of the ‘361 Patent is attached hereto as Exhibit 9.

77. The ‘361 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘361 Patent.

78. The ‘361 Patent relates to a method and system for quality-aware video optimization. Specifically, it teaches receiving an encoded video frame, decompressing it, extracting a first quantization parameter (QP), and acquiring a delta QP based on the first QP. The

method further includes acquiring a second QP based on the delta QP and the first QP, compressing the decompressed video frame based on the second QP, and providing the compressed video frame. The process is designed to reduce the byte size of the video stream as much as possible while limiting perceptual quality degradation to a controllable level.

79. The ‘361 Patent is directed to solving the problem of optimizing video quality in a way that balances the reduction of byte size with the preservation of perceptual quality. This involves a nuanced understanding of how quantization parameters (QPs) affect both the perceptual quality and the bitrate of a video frame, and how to manipulate these QPs to achieve the desired balance.

80. The ‘361 Patent identifies the shortcomings of the prior art. Specifically, existing single-pass rate control techniques had a problem in that the relationship between the compressed byte size of a video frame and its quantization parameter was only known after the frame was encoded. This made it challenging to achieve byte reduction and controllable quality degradation in a single pass.

81. The ‘361 Patent teaches the use of a quality-aware video optimization technique that requires only a single pass over the previously encoded video frame sequence to optimize the video frame sequence. It introduces a novel function that defines ΔQP according to the value of QPInput, allowing fine control of quality degradation in the byte-reduced content. It also considers differences between input and output compression formats (codecs) and computes codec adjustment that accounts for these differences.

82. The inventions disclosed in the ‘361 Patent provide significant benefits and improvements to the function of hardware in a computer network by enabling efficient video optimization. By allowing for single-pass, on-the-fly, quality-aware optimization, the patent’s

methods can be applied in various environments, including optimizing live video feeds before they traverse a low-capacity network segment, or optimizing surveillance video before archiving, thus saving storage space and network bandwidth.

83. The '361 Patent family has been cited by 30 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '361 Patent family as relevant prior art:

- Interdigital, Inc.
- Tencent Holdings Ltd
- Microsoft Corporation
- Qualcomm, Inc.
- Lattice Semiconductor
- Openwave Mobility, Inc.
- Samsung Electronics Co., Ltd.
- Beijing Dajia Interconnection Information Technology Co., Ltd.

U.S. PATENT NO. 9,749,713

84. U.S. Patent No. 9,749,713 entitled, *Budget Encoding*, was filed on October 15, 2009. The '713 Patent claims priority to U.S. Patent Application No. 12/580,212, which was filed on October 15, 2009. The '713 Patent is subject to a 35 U.S.C. § 154(b) term extension of 1654 days. A true and correct copy of the '713 Patent is attached hereto as Exhibit 10.

85. The '713 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '713 Patent.

86. The '713 Patent is directed to solving the problem of inefficient allocation and management of network resources. Traditional methods often fail to prioritize applications effectively, leading to suboptimal performance for critical applications and inefficient utilization of network resources.

87. The ‘713 Patent identifies the shortcomings of the prior art. Specifically, existing systems lacked the ability to dynamically allocate resources based on real-time needs and priorities of applications. This leads to either over-provisioning, which wastes resources, or under-provisioning, which can cause critical applications to suffer or fail.

88. The ‘713 Patent teaches the use of a resource manager that dynamically allocates network resources to applications based on a set of defined policies and priority levels. It involves continuous monitoring of the network and applications, and the resource manager makes real-time decisions to allocate or deallocate resources as needed. This ensures that critical applications always have the necessary resources, while other applications receive resources as available.

89. The inventions disclosed in the ‘713 Patent provide significant benefits and improvements to the function of the hardware in a computer network. By implementing a dynamic, policy-driven approach to resource allocation, the system ensures optimal performance for critical applications and efficient utilization of network resources. This leads to improved overall network performance, reduced waste, and the ability to adapt to changing conditions and demands.

90. The ‘713 Patent family has been cited by 41 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘713 Patent family as relevant prior art:

- Samsung Electronics Co., Ltd.
- Openwave Mobility, Inc.
- Huawei Investment & Holding Co., Ltd.
- Cisco Systems, Inc.
- Flash Networks Ltd.
- ZTE Corporation
- Vizio, Inc.
- Wangsu Science & Technology Co., Ltd.
- Akamai Technologies, Inc.
- SK Telecom Co., Ltd.

- Sugon Information Industry (Beijing) Co., Ltd.
- Netscout Systems, Inc.
- Microsoft Corporation
- Telefonaktiebolaget Lm Ericsson

U.S. PATENT NO. 8,429,169

91. U.S. Patent No. 8,429,169 entitled, *Systems and Methods For Video Cache Indexing*, was filed on July 29, 2011. The '169 Patent claims priority to U.S. Provisional Patent Application No. 61/369,513, which was filed on July 30, 2010. A true and correct copy of the '169 Patent is attached hereto as Exhibit 11.

92. The '169 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '169 Patent.

93. The '169 Patent is directed to solving the problem of inefficient caching of content, particularly when dynamic URLs are used to refer to the content. Traditional caching methods that index content based on URLs can lead to multiple cache entries for the same content or entries with expired references, reducing the efficiency and capacity of the cache. The technologies taught in the '169 Patent overcomes these inefficiencies by indexing the content cache based on a characterization of the content rather than the URL.

94. The '169 Patent identifies the shortcomings of the prior art. Specifically, that conventional content caching methods, especially those employing dynamic URLs, lead to two main inefficiencies: (a) multiple cache entries corresponding to the same video content, thereby reducing the cache's capacity to serve unique content, and (b) content cache entries with expired references to content, reducing the useful capacity of the content cache. These inefficiencies hinder the performance of middleware services and website performance.

95. The ‘169 Patent teaches the use of a novel approach to cache video content by indexing the content cache based on a characterization of the video content rather than the URL. This method involves identifying characterization data related to the content request and using a hash function to generate an index. This index is then used to identify the corresponding entry in the cache data structure. By avoiding the use of dynamic URLs in the indexing process, the patent’s method allows for more efficient caching, eliminating redundancies and invalid entries, and improving the overall efficiency of content delivery.

96. The inventions disclosed in the ‘169 Patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling more efficient caching of video content. By indexing the content cache based on the characterization of the content rather than the URL, the patented method avoids the problems of redundant and invalid cache entries. This leads to better utilization of cache capacity, reduced burden on network infrastructure and web servers, and faster content delivery to users. The invention also allows for distinguishing between similar but non-identical videos, avoiding content aliasing, and ensuring that the correct content is delivered to the user.

97. The ‘169 Patent family has been cited by 92 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘169 Patent family as relevant prior art:

- Akamai Technologies, Inc.
- AMC Networks Inc.
- AT&T Inc.
- Atlassian Pty Ltd
- Canon Inc.
- Charter Communications, Inc.
- China Mobile Communications Corporation
- EchoStar Corporation
- Huawei Investment & Holding Co., Ltd.
- Interdigital, Inc.

- Juniper Networks, Inc.
- Koninklijke Philips Nv
- Microsoft Corporation
- Open Text Corporation
- SK Telecom Co., Ltd.
- Skyfire Labs, Inc., California
- ZTE Corporation

U.S. PATENT NO. 10,412,388

98. U.S. Patent No. 10,412,388 entitled, *Framework for Quality-Aware Video Optimization*, was filed on January 8, 2018. The '388 Patent claims priority to U.S. Patent Application No. 12/751,951, which was filed on March 31, 2010, and which claims priority to U.S. Provisional Patent Application No. 61/165,224, which was filed on March 31, 2009. A true and correct copy of the '388 Patent is attached hereto as Exhibit 12.

99. The '388 Patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '388 Patent.

100. The '388 Patent generally relates to a method and system for quality-aware video optimization. It teaches receiving an encoded video frame, decompressing it, extracting a first quantization parameter (QP), and acquiring a delta QP based on the first QP. The method also includes acquiring a second QP based on the delta QP and the first QP, compressing the decompressed video frame based on the second QP, and providing the compressed video frame. The process allows for fine control of quality degradation in byte-reduced content and can be applied to transcoding scenarios where the input and output compression formats are different.

101. The '388 Patent identifies the shortcomings of the prior art. Specifically, existing single-pass rate control techniques had a problem in that the relationship between the compressed byte size of a video frame and its quantization parameter were only known after the frame is

encoded. This made it challenging to achieve byte reduction and controllable quality degradation in a single pass.

102. The ‘388 Patent teaches the use of a quality-aware video optimization technique that modifies a video frame sequence to reduce the byte size while limiting perceptual quality degradation to a controllable level.

103. The inventions disclosed in the ‘388 Patent provide significant benefits and improvements to the function of hardware in a computer network by enabling efficient video optimization. The method allows for single-pass, on-the-fly quality-aware optimization, making it well-suited for various environments, including live video feeds and storage arrays.

104. The ‘388 Patent family has been cited by 30 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘388 Patent family as relevant prior art:

- Interdigital, Inc.
- Tencent Holdings Ltd
- Microsoft Corporation
- Qualcomm, Inc.
- Lattice Semiconductor
- Openwave Mobility, Inc.
- Samsung Electronics Co., Ltd.
- Beijing Dajia Interconnection Information Technology Co., Ltd.

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 9,191,664

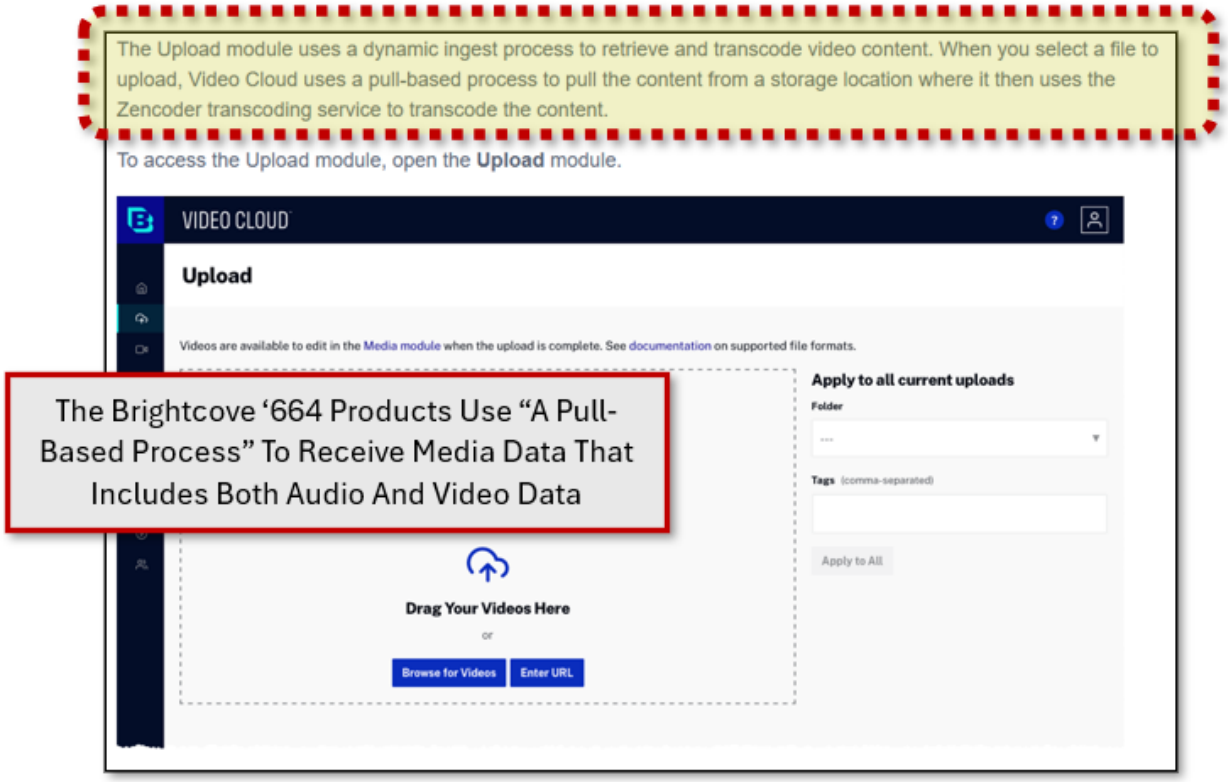
105. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

106. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products for adaptive bitrate management.

107. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Zencoder, Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove products incorporating Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '664 Product(s)").

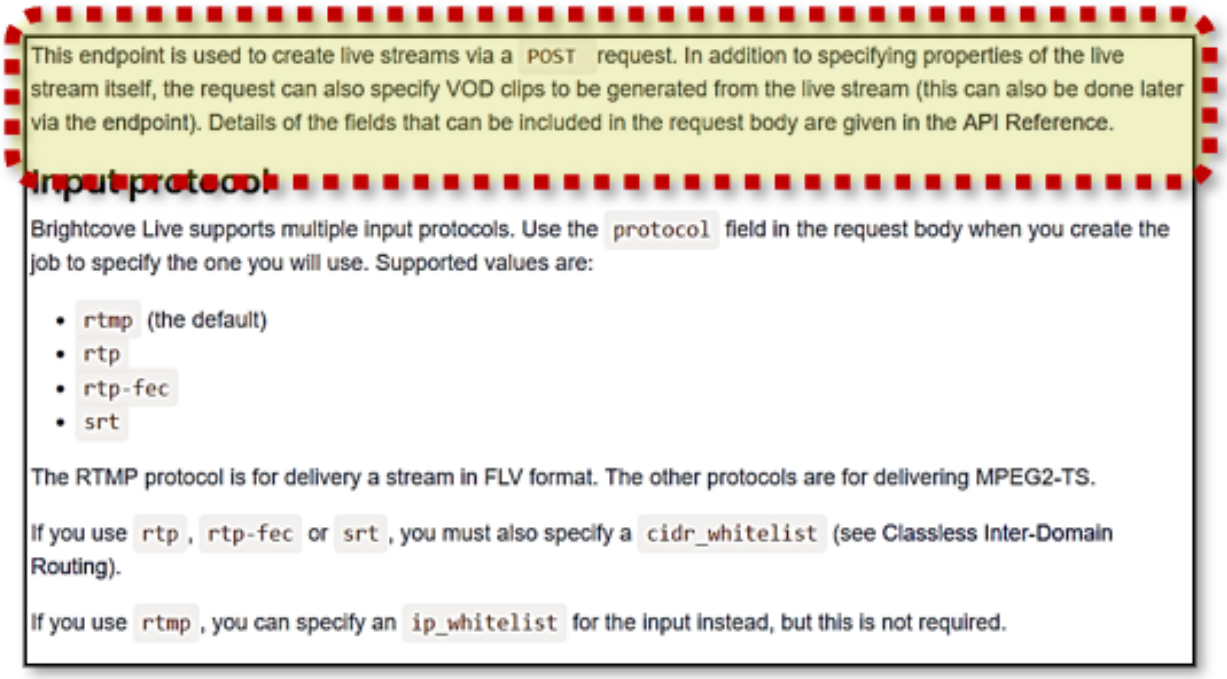
108. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '664 Products in regular business operations.

109. The Brightcove '664 Products receive media data, including both audio and video data, through several ingestion methods, such as the Upload module and the Dynamic Ingest API. Specifically, the Brightcove '664 Products' Upload module ingests files that include both audio and video data from their local machines or cloud storage. In addition, the Brightcove '664 Products use the Dynamic Ingest API to receive media data in a variety of input formats and protocols, including standard HTTP/HTTPS, S3, and FTP.



Uploading Videos Using the Upload Module, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://studio.support.brightcove.com/media/manage/uploading-videos-using-upload-module.html (last visited January 2025) (emphasis added).

110. The Brightcove '664 Products receive media data using Brightcove's Dynamic Ingest API which accepts a master object with a url field that specifies the location of the source video file (containing both video and audio). Specifically, the Dynamic Ingest API performs the receiving of a variety of audio formats, including AAC, MP3, and Dolby audio codecs. In addition, the Brightcove '664 Products receive media data using Brightcove's Live module which receives media data, including both audio and video, by accepting live streams from encoders. Specifically, the Live module supports input formats such as RTMP, RTP, SRT, and Zixi, allowing for the ingestion of live video and audio streams. Further, the Brightcove '664 Products receive media data from video encoders at a Streaming Endpoint (RTMP URL).



This endpoint is used to create live streams via a `POST` request. In addition to specifying properties of the live stream itself, the request can also specify VOD clips to be generated from the live stream (this can also be done later via the endpoint). Details of the fields that can be included in the request body are given in the API Reference.

Input protocol

Brightcove Live supports multiple input protocols. Use the `protocol` field in the request body when you create the job to specify the one you will use. Supported values are:

- `rtmp` (the default)
- `rtp`
- `rtp-fec`
- `srt`

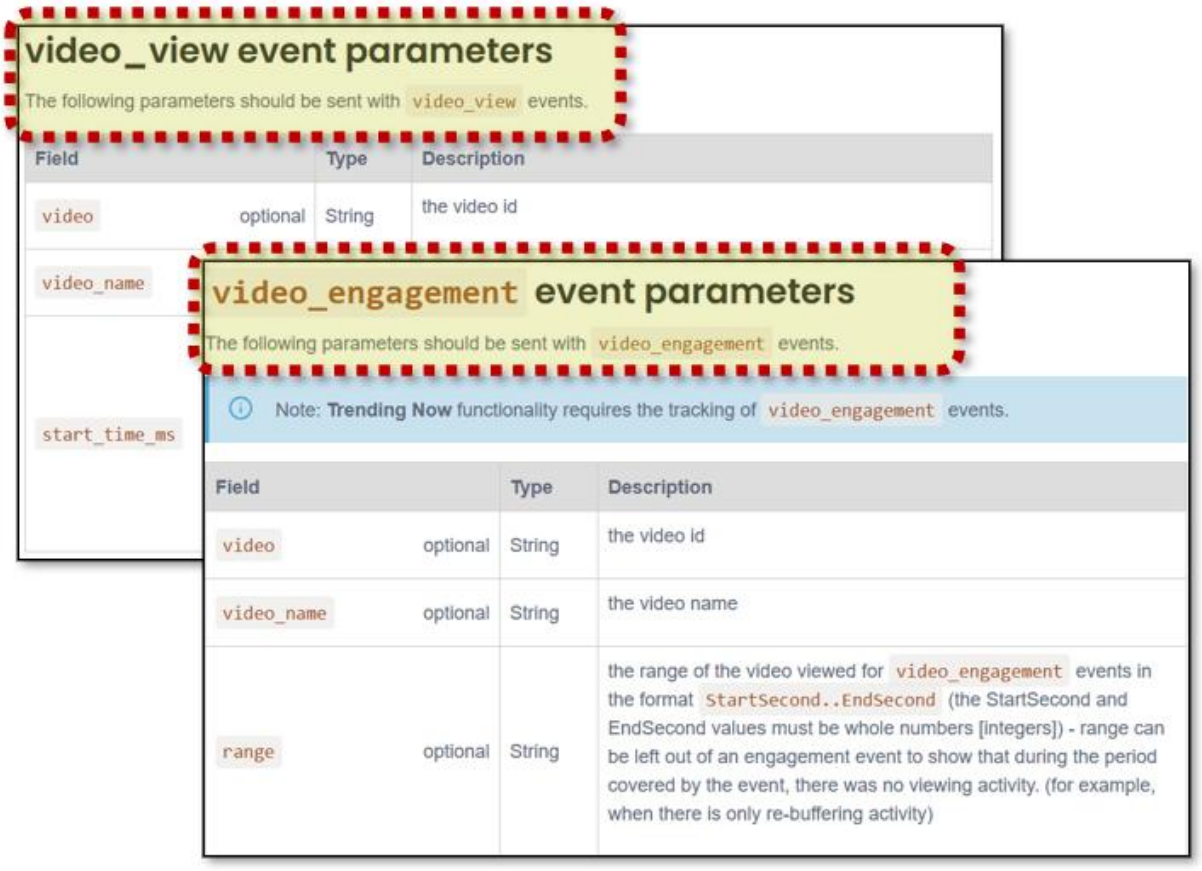
The RTMP protocol is for delivery a stream in FLV format. The other protocols are for delivering MPEG2-TS.

If you use `rtp`, `rtp-fec` or `srt`, you must also specify a `cidr_whitelist` (see Classless Inter-Domain Routing).

If you use `rtmp`, you can specify an `ip_whitelist` for the input instead, but this is not required.

Overview: Brightcove Live API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/live-api/getting-started/overview-brightcove-live-api.html (last visited January 2025) (emphasis added).

111. The Brightcove '664 Products receive feedback information from a terminal (*e.g.*, Brightcove Player or the Brightcove Native SDKs). Specifically, the Brightcove '664 Products gather a range of feedback metrics that describe how the transmitted media is being received and played back. For example, the Brightcove '664 Products capture events such as video_view, video_engagement, and error events. This data exchange is enabled by the Brightcove '664 Products through parameters like event=video_view in API requests.



video_view event parameters

The following parameters should be sent with video_view events.

Field		Type	Description
video	optional	String	the video id
video_name			
start_time_ms			

video_engagement event parameters

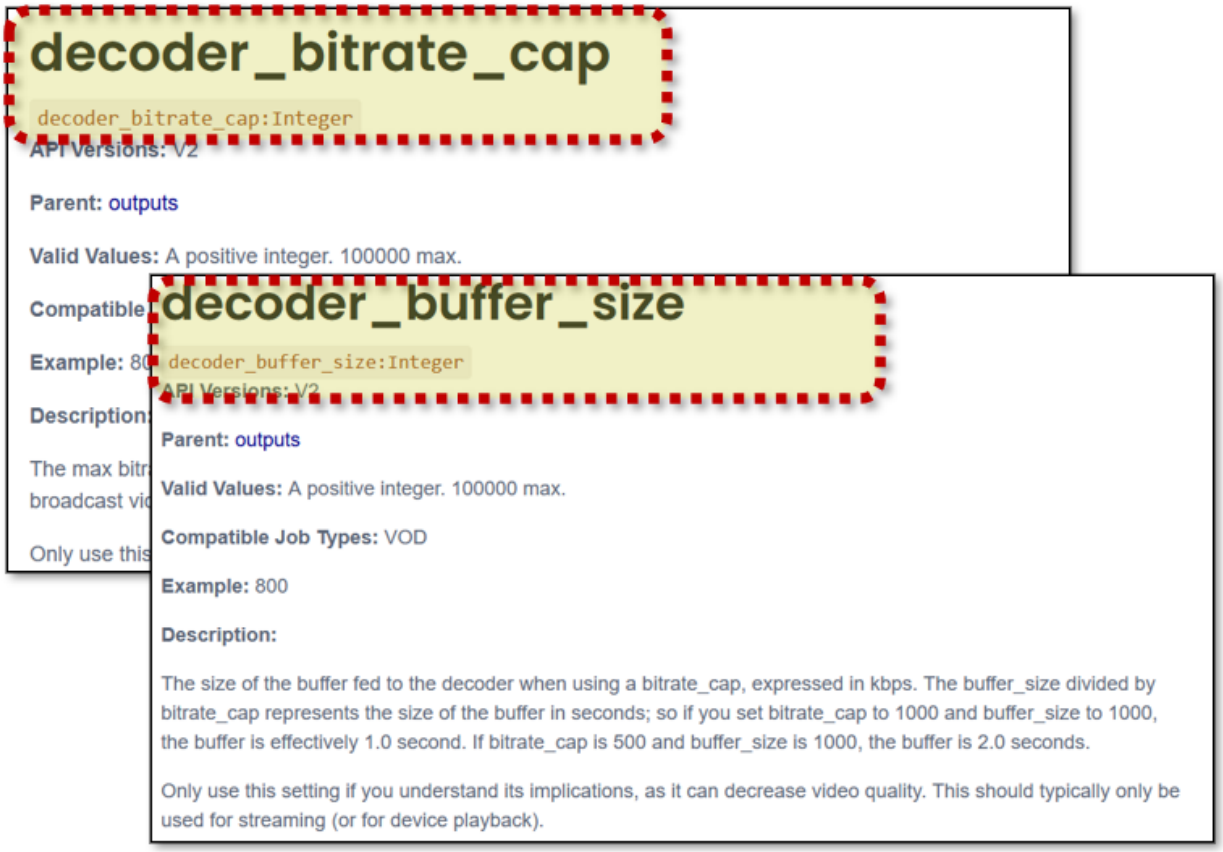
The following parameters should be sent with video_engagement events.

Note: **Trending Now** functionality requires the tracking of video_engagement events.

Field		Type	Description
video	optional	String	the video id
video_name	optional	String	the video name
range	optional	String	the range of the video viewed for video_engagement events in the format StartSecond..EndSecond (the StartSecond and EndSecond values must be whole numbers [integers]) - range can be left out of an engagement event to show that during the period covered by the event, there was no viewing activity. (for example, when there is only re-buffering activity)

Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

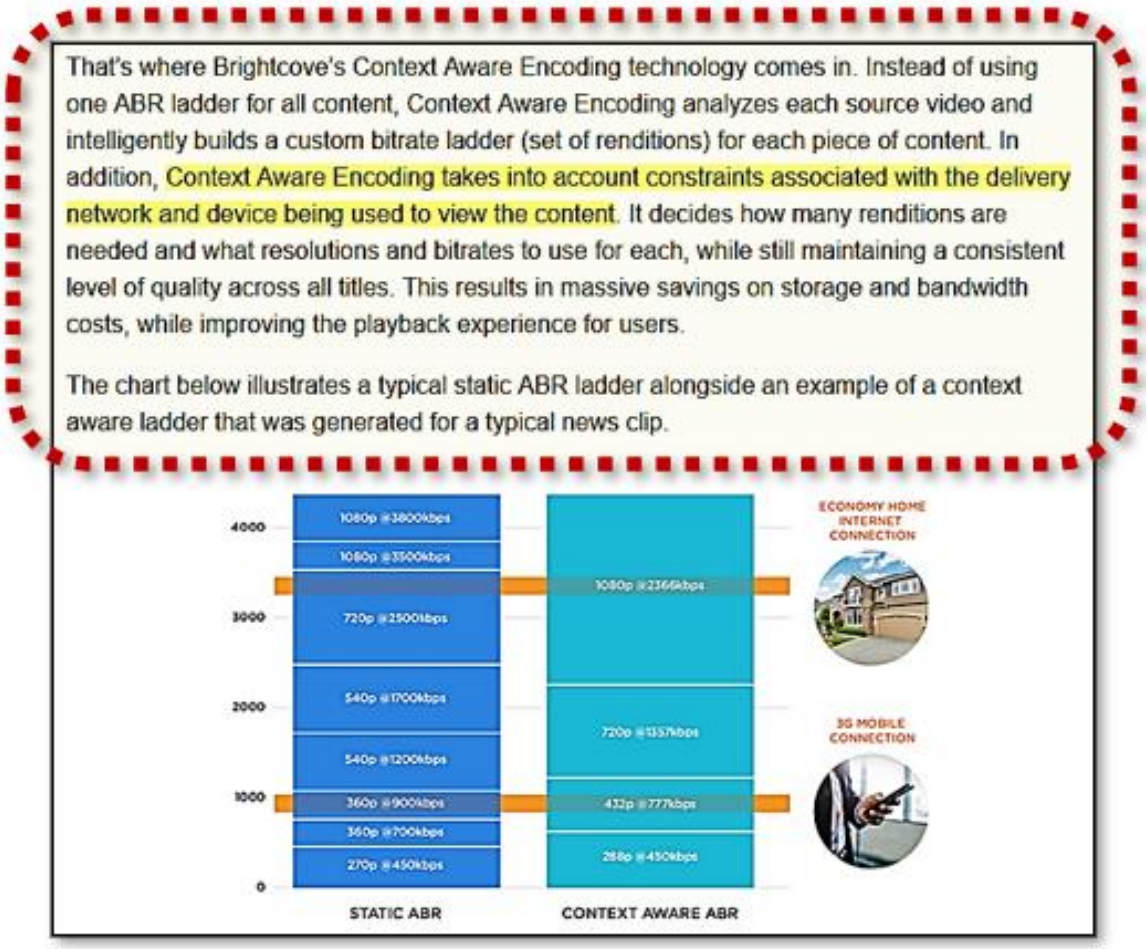
112. The Brightcove '664 Products receive detailed information about playback sessions, including the session identifier (a unique string representing a single viewing session). Further, the Brightcove '664 Products receive feedback information including metrics like start time and duration of viewing. This feedback information enables the Brightcove '664 Products to estimate network conditions by comparing the desired bitrate with what can be successfully delivered, enabling video delivery optimization. The Brightcove '664 Products use the feedback information to make adjustments in media delivery, as reflected in adjustments to decoder_bitrate_cap and decoder_buffer_size as shown in the below excerpt from Brightcove documentation of the Brightcove '664 Products.



Rate Control Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-rate-control.html (last visited January 2025) (emphasis added).

113. The Brightcove '664 Products estimate network conditions using the feedback information. Specifically, the Brightcove '664 Products use feedback data from both web players and native SDK players, which includes metrics such as bandwidth, buffering events, and device capabilities. For example, the Brightcove '664 Products receive video_view event data that includes the video_duration and time, which can be used to assess playback performance. In addition, the Brightcove '664 Products receive video_engagement event data which provides rebuffering_seconds and rebuffering_count metrics which are used to estimate network conditions. Further, Brightcove's Context Aware Encoding and Dynamic Delivery functionality in the Brightcove '664 Products utilize feedback information to set video encoding and delivery

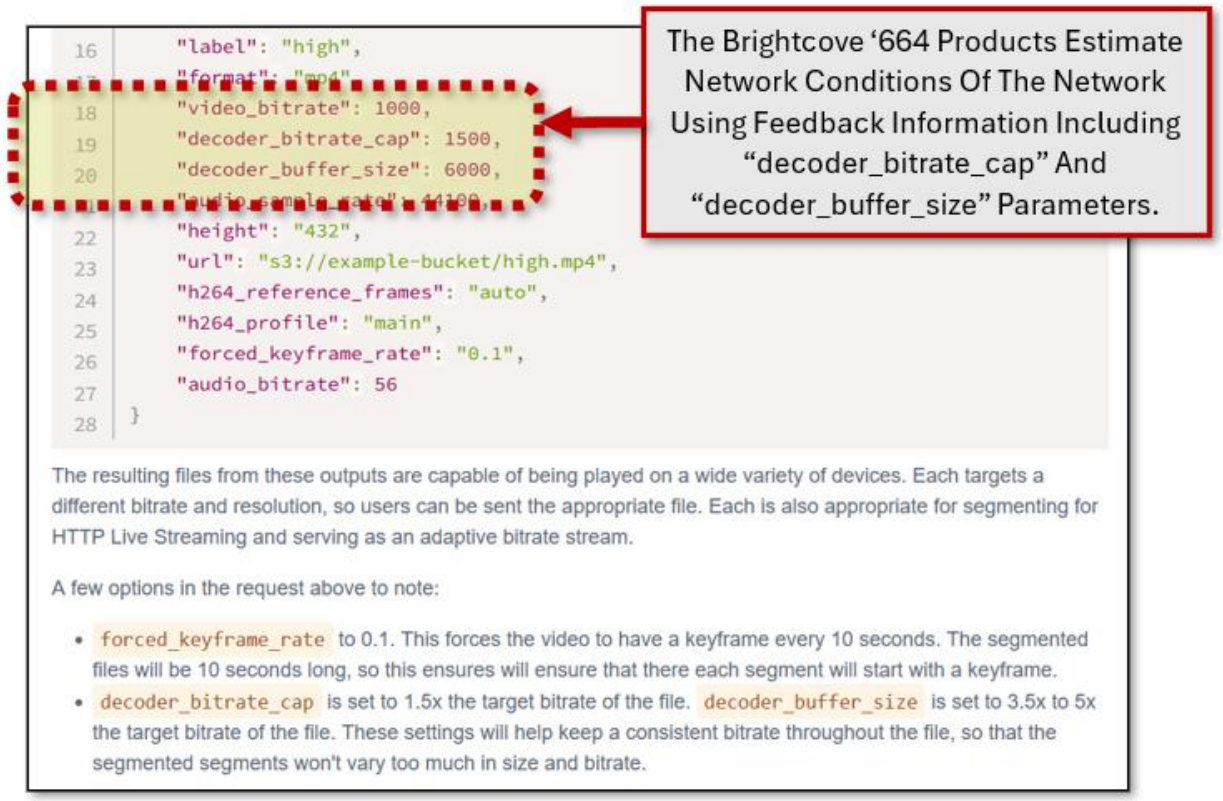
parameters. The Brightcove '664 Products' documentation states that Brightcove's context aware encoding "takes into account constraints associated with the delivery network and device being used to view the content," and that Brightcove Dynamic Delivery uses information about "the bandwidth currently available, buffer fullness, and the size of the playback window."



Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

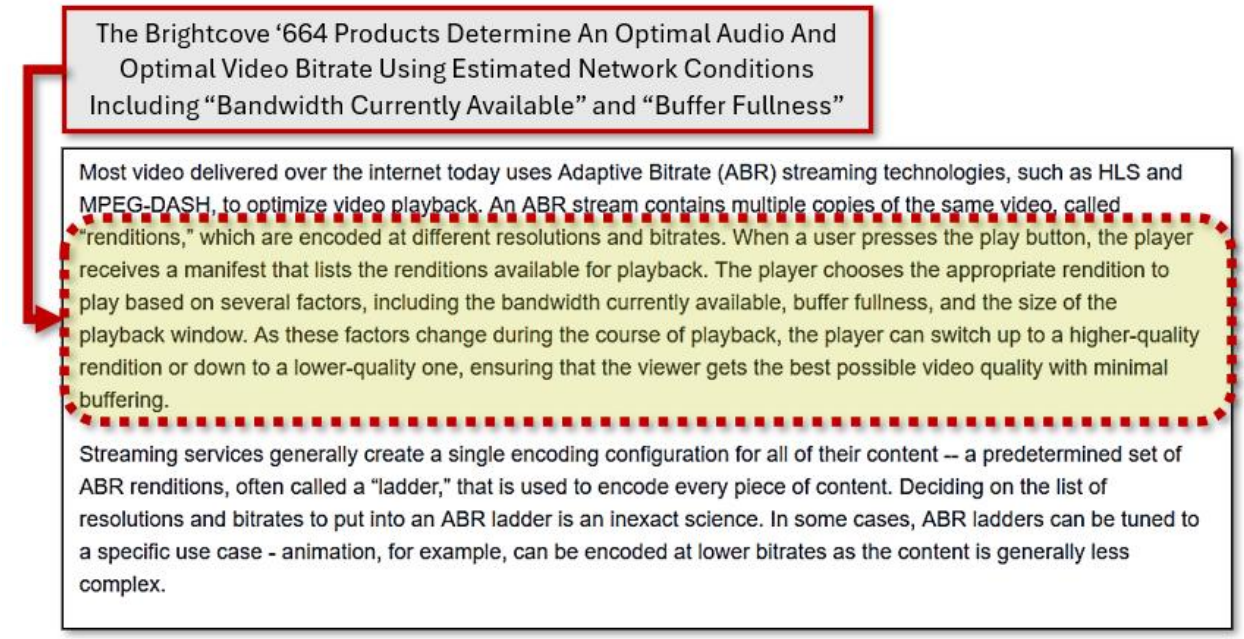
114. The Brightcove '664 Products estimate network conditions by analyzing data received from a terminal. Specifically, the Brightcove '664 Products receive feedback information such as segment download duration, player buffer fullness, and re-buffering frequency. For example, when feedback data showing slower segment downloads or buffer depletion events is

received by the Brightcove '664 Products the products estimate that the available bandwidth is lower and adjust video delivery. The Brightcove '664 Products adjust estimates of network conditions by referencing parameters like "decoder_bitrate_cap" and "decoder_buffer_size," which reflect throughput and latency. Specifically, the Brightcove '664 Products track how rapidly segments are retrieved and how smoothly the playback buffer is replenished, approximating network conditions. For instance, if the observed bandwidth comfortably exceeds the current bitrate demands, the Brightcove '664 Products interpret that capacity as indicative of stable network conditions. By correlating feedback metrics with known encoding thresholds, the Brightcove '664 Products estimate network conditions such as available bandwidth and overall link stability.



Transmuxing Guide, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-guides/creating-mp4-and-hls-outputs-together.html (last visited January 2025) (annotation added).

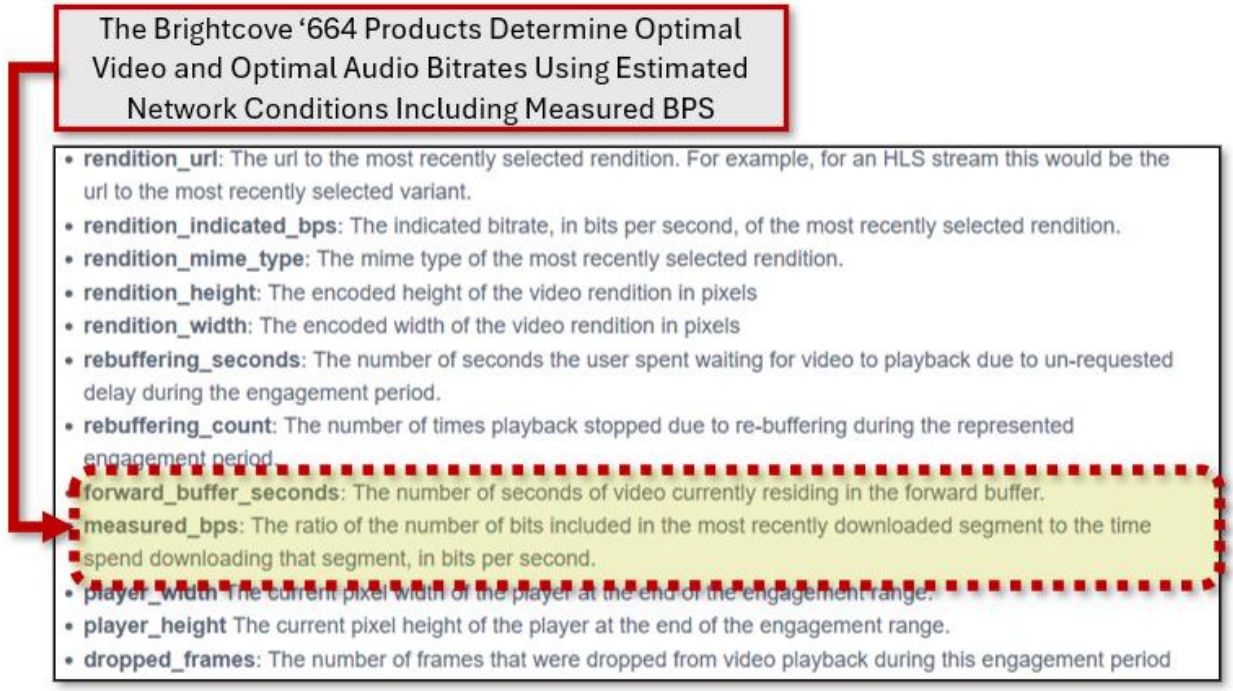
115. The Brightcove '664 Products, through Context Aware Encoding (CAE) and Dynamic Delivery functionality, determine an optimal audio bitrate and an optimal audio bitrate using the one or more network conditions. For example, the Brightcove '664 Products evaluate factors such as buffering events and connection speed, as evidenced by the documentation's reference to "bandwidth currently available" and adjusting "decoder_bitrate_cap" and "decoder_buffer_size" to determine an optimal audio and optimal video bitrate.



Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/general-information/overview-context-aware-encoding.html (last visited January 2025) (annotation added).

116. The Brightcove '664 Products perform comparisons to ascertain network stability and determine an optimal audio bitrate and optimal video bitrate. In particular, the Brightcove '664 Products compare the "time in transit" for media segments, approximated through metrics like "decoder_buffer_size", against acceptable thresholds. Additionally, the Brightcove '664 Products evaluate the relationship between "measured_bps" and "rendition_indicated_bps" to align the received bitrate with network conditions. This process is evident in the ability to switch

to different quality renditions during playback, which demonstrates a determination of an optimal bitrate for the audio and video data. If the Brightcove '664 Products deem the network stable—based on the ongoing throughput and buffer-state measurements the Brightcove '664 Products select higher bitrate renditions of the audio and video data. Conversely, if measured conditions indicate persistent congestion or slow delivery, the Brightcove '664 Products automatically adjust the bitrates downward.



Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (annotation added).

117. The Brightcove '664 Products encode audio media data and video media data according to the optimal audio bitrate and the optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '664 Products encode audio and video media using a Dynamic Delivery ingest profiles

wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '664 Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.

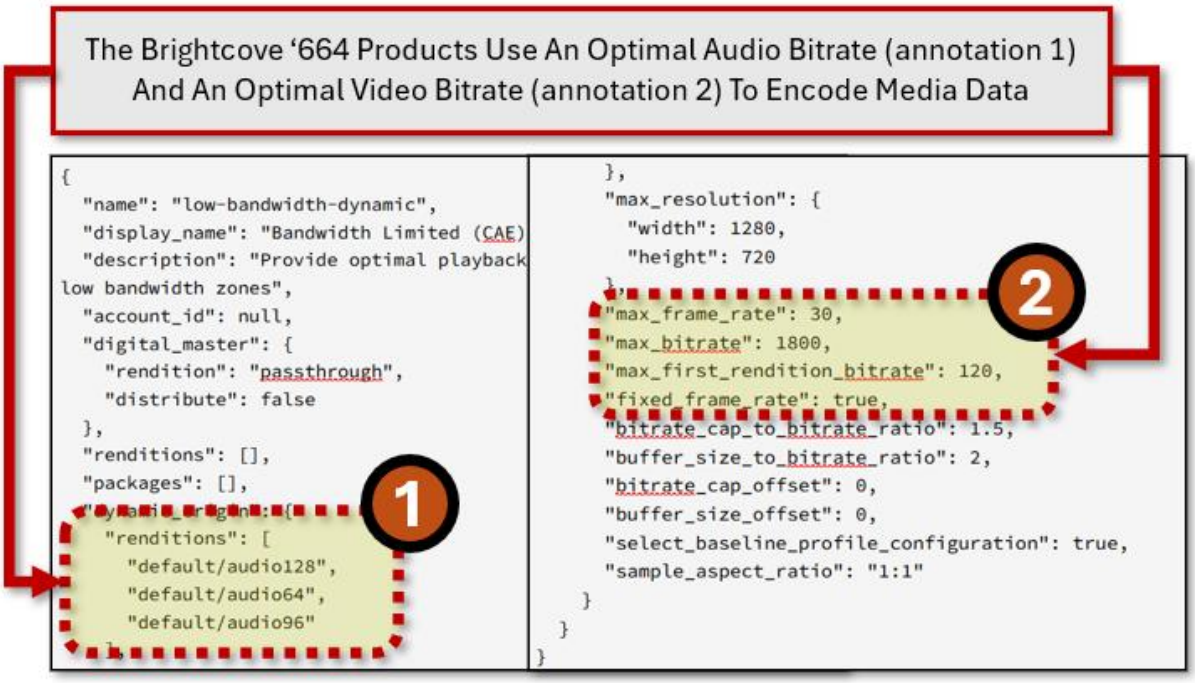
Progressive video renditions

Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

118. The Brightcove '664 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '664 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and

"keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '664 Products set indicate minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, available at: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

119. The Brightcove '664 Products provide the encoded audio media data and video media data for transmission to a terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove '664 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove '664 Products generate manifests (such as HLS or DASH) that reference different video renditions, each encoded at specific bitrates.

120. Brightcove has directly infringed and continues to directly infringe the '664 Patent by, among other things, making, using, offering for sale, and/or selling technology comprising a method of adaptive bitrate management, including but not limited to the Brightcove '664 Products.

121. The Brightcove '664 Products are available to businesses and individuals throughout the United States.

122. The Brightcove '664 Products are provided to businesses and individuals located in this District.

123. By making, using, testing, offering for sale, and/or selling products and services comprising a method of adaptive bitrate management, including but not limited to the Brightcove '664 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '664 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

124. Brightcove has had knowledge of the '664 Patent and its infringement of the '664 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '664 Patent is well-known within the industry as demonstrated by multiple citations to the '664 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '664 Patent despite knowing of the '664 Patent and its infringement thereof. Brightcove is infringing the '664 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

125. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '664 Patent.

126. As a result of Brightcove's infringement of the '664 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's

infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 8,621,061

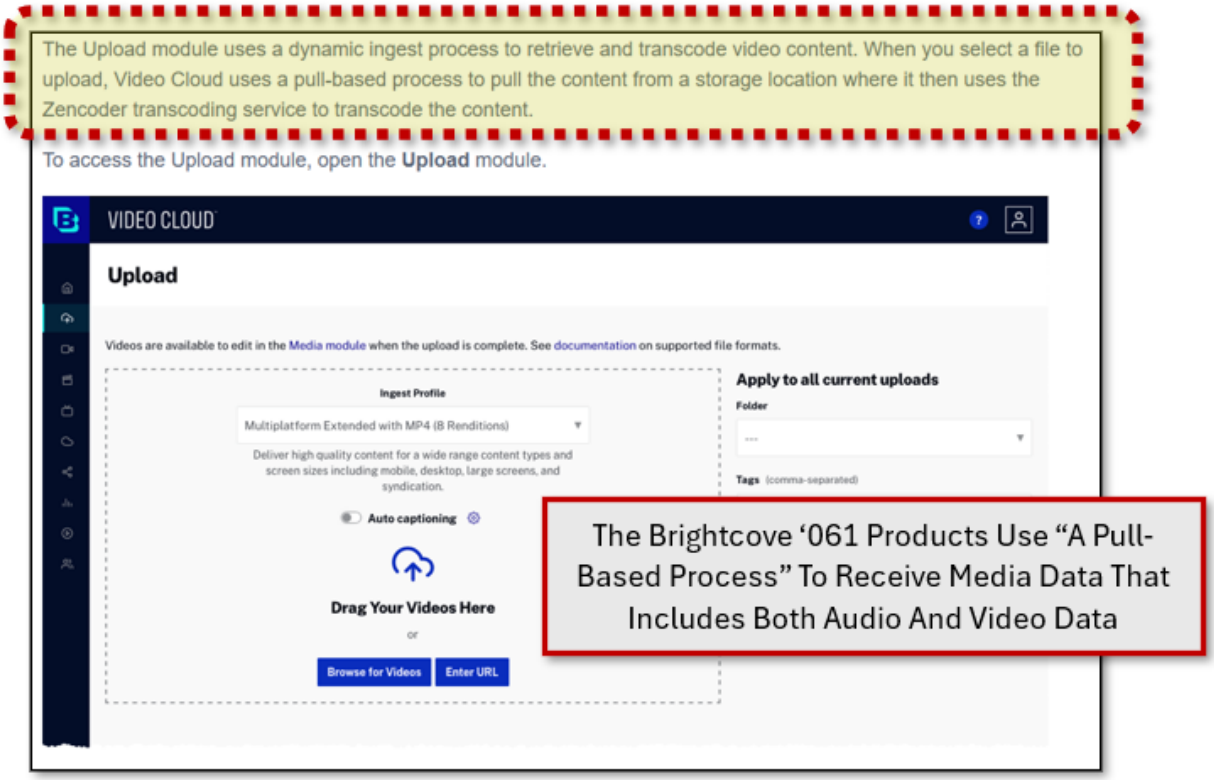
127. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

128. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising the claimed adaptive bitrate management technology disclosed in the '061 Patent.

129. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '061 Product(s)").

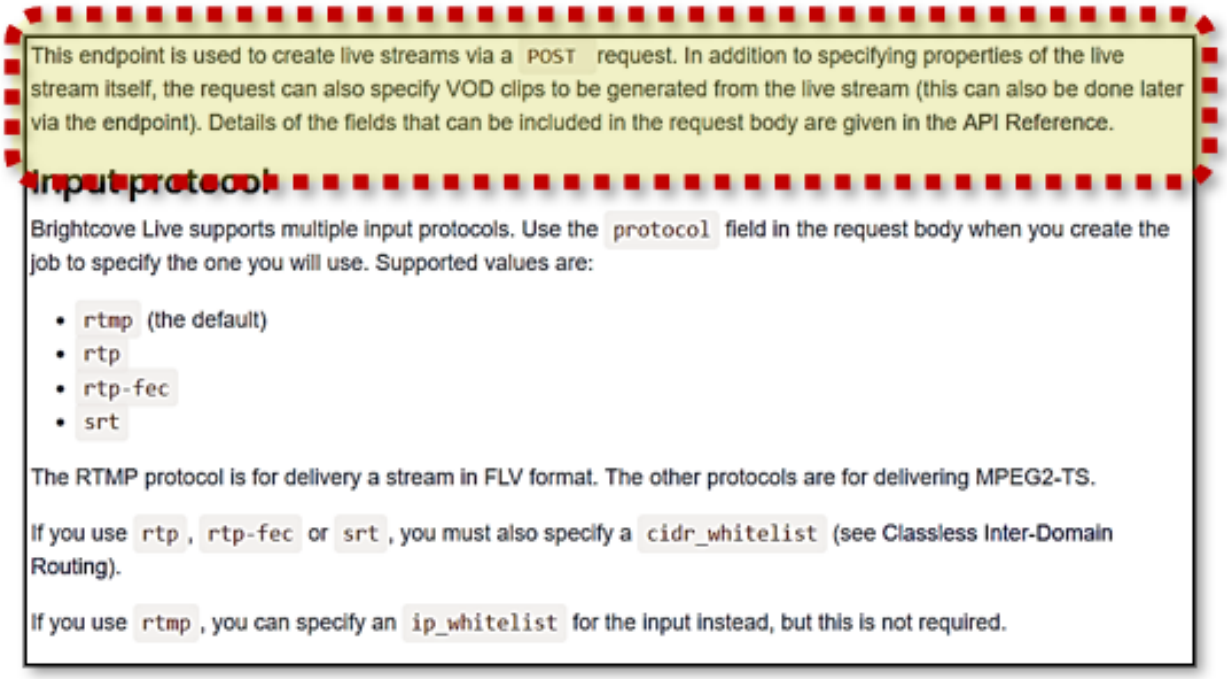
130. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '061 Products in regular business operations.

131. The Brightcove '061 Products receive media data, including both audio and video data, through several ingestion methods, such as the Upload module and the Dynamic Ingest API. Specifically, the Brightcove '061 Upload module ingests files that include both audio and video data from their local machines or cloud storage. In addition, the Brightcove '061 Products use the Dynamic Ingest API to receive media data in a variety of input formats and protocols, including standard HTTP/HTTPS, S3, and FTP.



Uploading Videos Using the Upload Module, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://studio.support.brightcove.com/media/manage/uploading-videos-using-upload-module.html (last visited January 2025) (emphasis added).

132. The Brightcove '061 Products receive media data using Brightcove's Dynamic Ingest API which accepts a master object with a url field that specifies the location of the source video file (containing both video and audio). Specifically, the Dynamic Ingest API performs the receiving of a variety of audio formats, including AAC, MP3, and Dolby audio codecs. In addition, the Brightcove '061 Products receive media data using Brightcove's Live module which receives media data, including both audio and video, by accepting live streams from encoders. Specifically, the Live module supports input formats such as RTMP, RTP, SRT, and Zixi, allowing for the ingestion of live video and audio streams. Further, the Brightcove '061 Products receive media data from video encoders at a Streaming Endpoint (RTMP URL).



This endpoint is used to create live streams via a `POST` request. In addition to specifying properties of the live stream itself, the request can also specify VOD clips to be generated from the live stream (this can also be done later via the endpoint). Details of the fields that can be included in the request body are given in the API Reference.

Input protocol

Brightcove Live supports multiple input protocols. Use the `protocol` field in the request body when you create the job to specify the one you will use. Supported values are:

- `rtmp` (the default)
- `rtp`
- `rtp-fec`
- `srt`

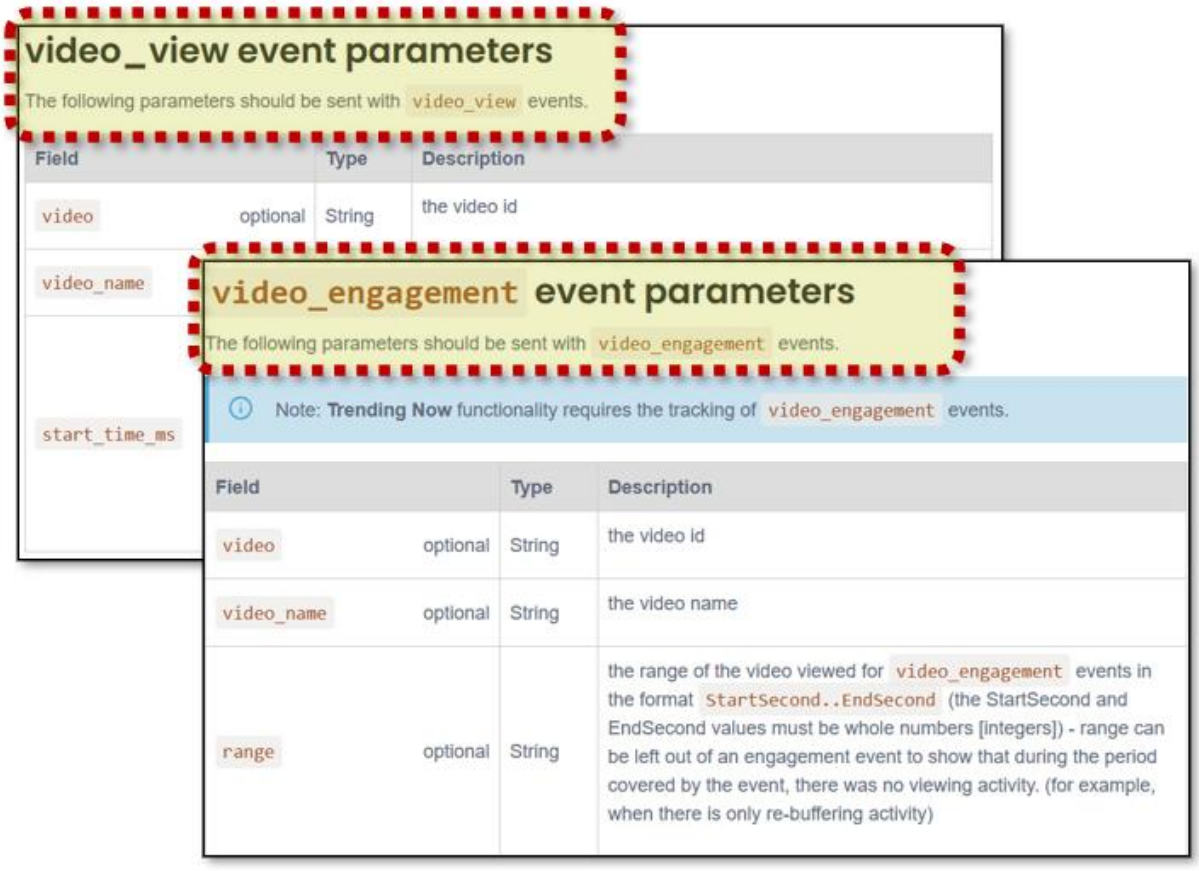
The RTMP protocol is for delivery a stream in FLV format. The other protocols are for delivering MPEG2-TS.

If you use `rtp`, `rtp-fec` or `srt`, you must also specify a `cidr_whitelist` (see Classless Inter-Domain Routing).

If you use `rtmp`, you can specify an `ip_whitelist` for the input instead, but this is not required.

Overview: Brightcove Live API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/live-api/getting-started/overview-brightcove-live-api.html (last visited January 2025) (emphasis added).

133. The Brightcove '061 Products receive receiver reports from a terminal (*e.g.*, Brightcove Player or the Brightcove Native SDKs). Specifically, the Brightcove '061 Products gather a range of feedback metrics that describe how the transmitted media is being received and played back. For example, the Brightcove '061 Products capture events such as video_view, video_engagement, and error events. This data exchange is enabled by the Brightcove '061 Products through parameters like event=video_view in API requests.



video_view event parameters

The following parameters should be sent with video_view events.

Field		Type	Description
video	optional	String	the video id
video_name			
start_time_ms			

video_engagement event parameters

The following parameters should be sent with video_engagement events.

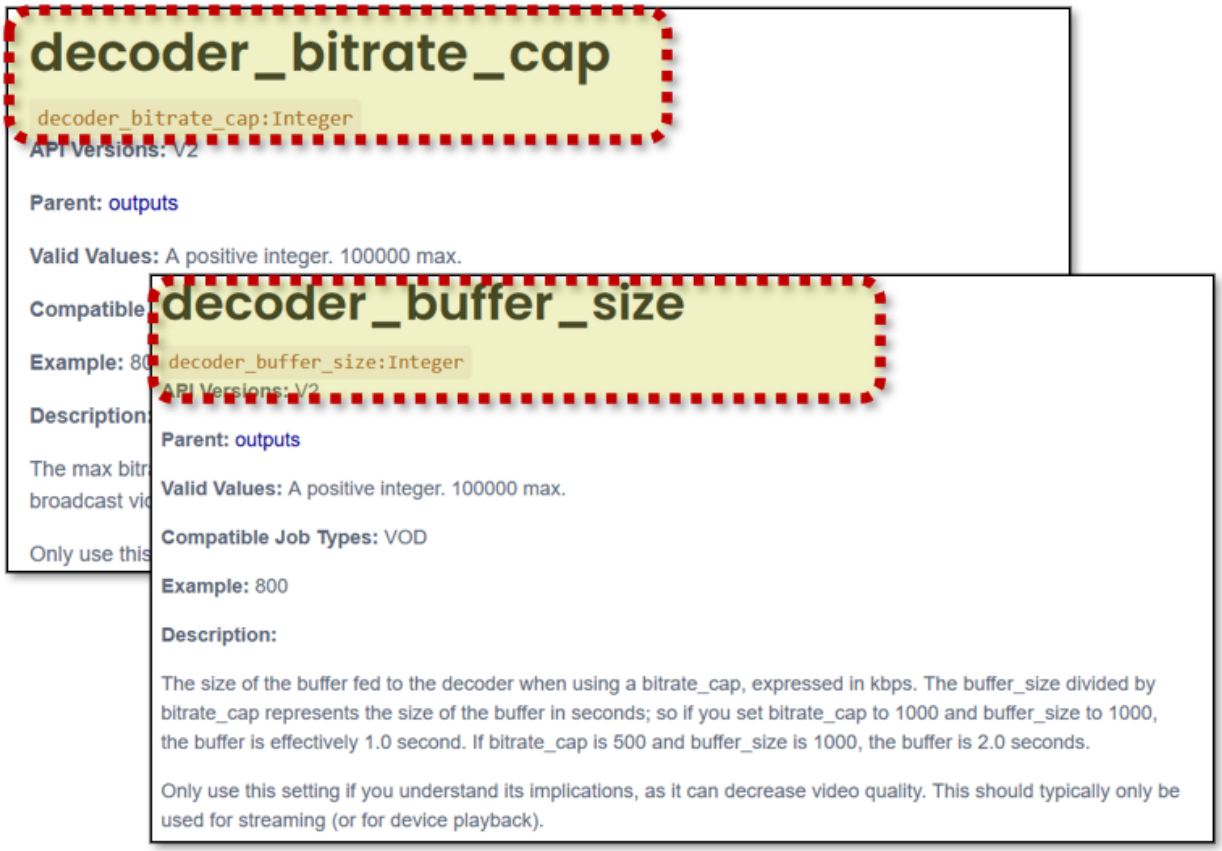
Note: **Trending Now** functionality requires the tracking of video_engagement events.

Field		Type	Description
video	optional	String	the video id
video_name	optional	String	the video name
range	optional	String	the range of the video viewed for video_engagement events in the format StartSecond..EndSecond (the StartSecond and EndSecond values must be whole numbers [integers]) - range can be left out of an engagement event to show that during the period covered by the event, there was no viewing activity. (for example, when there is only re-buffering activity)

Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, available at: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

134. The Brightcove '061 Products receive detailed information about playback sessions, including the session identifier (a unique string representing a single viewing session). Further, the Brightcove '061 Products receive receiver reports including in the form of data showing when a viewer interacts with a video player, such as starting or pausing playback. For instance, the Brightcove '061 Products capture events like play_request and video_engagement, which include metrics like start time and duration of viewing. These reports enable the Brightcove '061 Products to estimate network conditions by comparing the desired bitrate with what can be successfully delivered, enabling video delivery optimization. The Brightcove '061 Products receive receiver reports and use that data to make adjustments in media delivery, as reflected in

adjustments to decoder_bitrate_cap and decoder_buffer_size as shown in the below excerpt from Brightcove documentation of the Brightcove '061 Products.



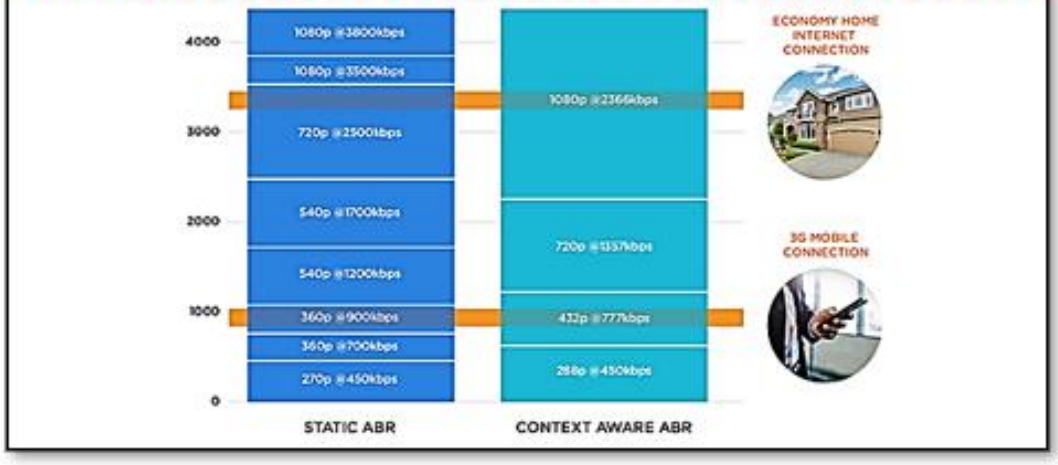
Rate Control Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-rate-control.html (last visited January 2025) (emphasis added).

135. The Brightcove '061 Products estimate one or more network conditions of a media network using the receiver report. Specifically, the Brightcove '061 Products use feedback data from both web players and native SDK players, which includes metrics such as bandwidth, buffering events, and device capabilities. For example, the Brightcove '061 Products receive video_view event data that includes the video_duration and time, which can be used to assess playback performance. In addition, the Brightcove '061 Products receive video_engagement event data which provides rebuffering_seconds and rebuffering_count metrics which are used to estimate

network conditions. Further, Brightcove's Context Aware Encoding (CAE) and Dynamic Delivery functionality in the Brightcove '061 Products utilize receiver report data (feedback data) to set video encoding and delivery parameters. Brightcove '061 Products' documentation states that Brightcove's CAE "takes into account constraints associated with the delivery network and device being used to view the content," and that Brightcove Dynamic Delivery uses information about "the bandwidth currently available, buffer fullness, and the size of the playback window."

That's where Brightcove's Context Aware Encoding technology comes in. Instead of using one ABR ladder for all content, Context Aware Encoding analyzes each source video and intelligently builds a custom bitrate ladder (set of renditions) for each piece of content. In addition, Context Aware Encoding takes into account constraints associated with the delivery network and device being used to view the content. It decides how many renditions are needed and what resolutions and bitrates to use for each, while still maintaining a consistent level of quality across all titles. This results in massive savings on storage and bandwidth costs, while improving the playback experience for users.

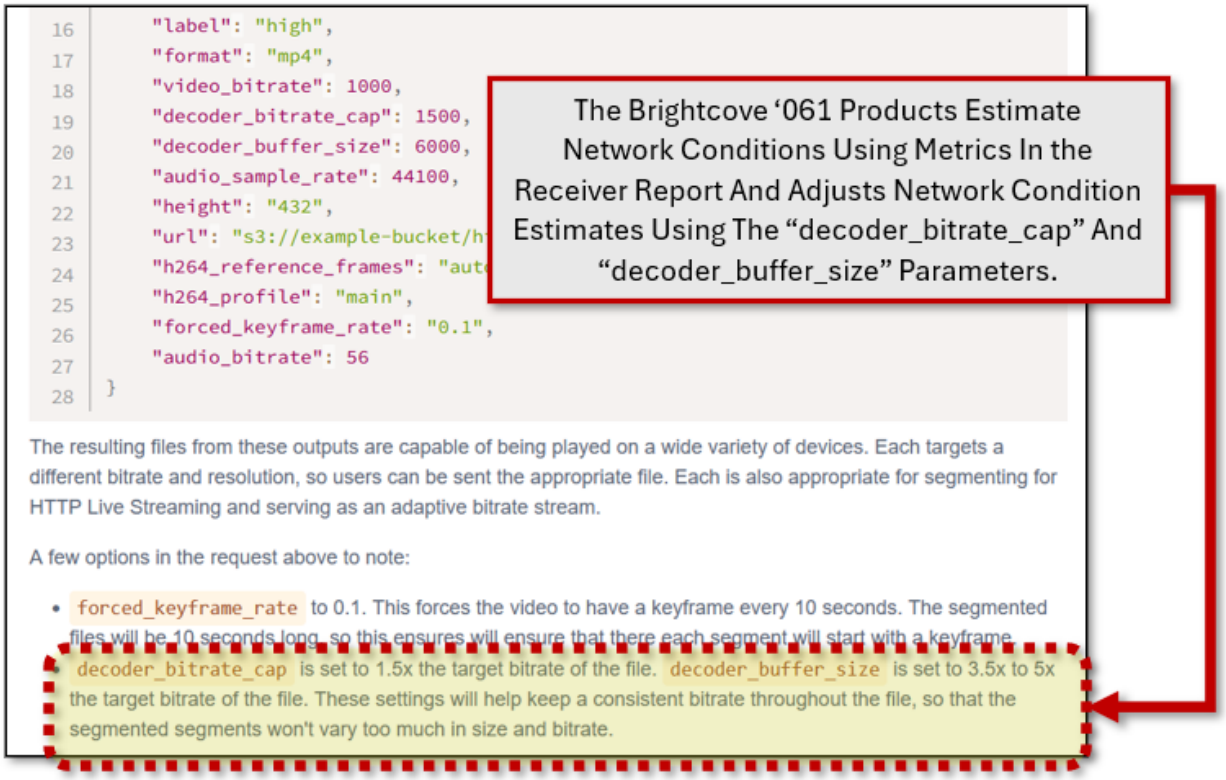
The chart below illustrates a typical static ABR ladder alongside an example of a context aware ladder that was generated for a typical news clip.



Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

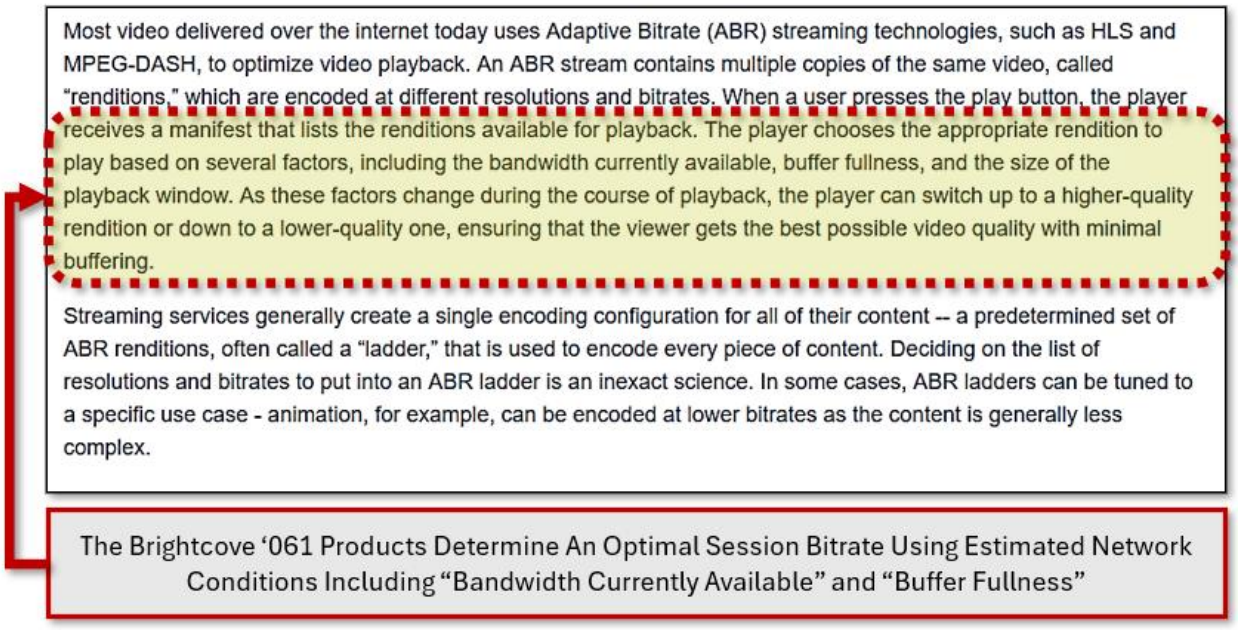
136. The Brightcove '061 Products estimate network conditions by analyzing data received from an interface. Specifically, the Brightcove '061 Products inspect metrics such as

segment download duration, player buffer fullness, and re-buffering frequency. For example, when feedback data showing slower segment downloads or buffer depletion events is received by the Brightcove '061 Products the products estimate that the available bandwidth is lower and adjust video delivery. The Brightcove '061 Products adjust estimates of network conditions by referencing parameters like "decoder_bitrate_cap" and "decoder_buffer_size," which reflect throughput and latency. Specifically, the Brightcove '061 Products track how rapidly segments are retrieved and how smoothly the playback buffer is replenished, approximating network conditions. For instance, if the observed bandwidth comfortably exceeds the current bitrate demands, the Brightcove '061 Products interpret that capacity as indicative of stable network conditions. By correlating feedback metrics with known encoding thresholds, the Brightcove '061 Products estimate network conditions such as available bandwidth and overall link stability.



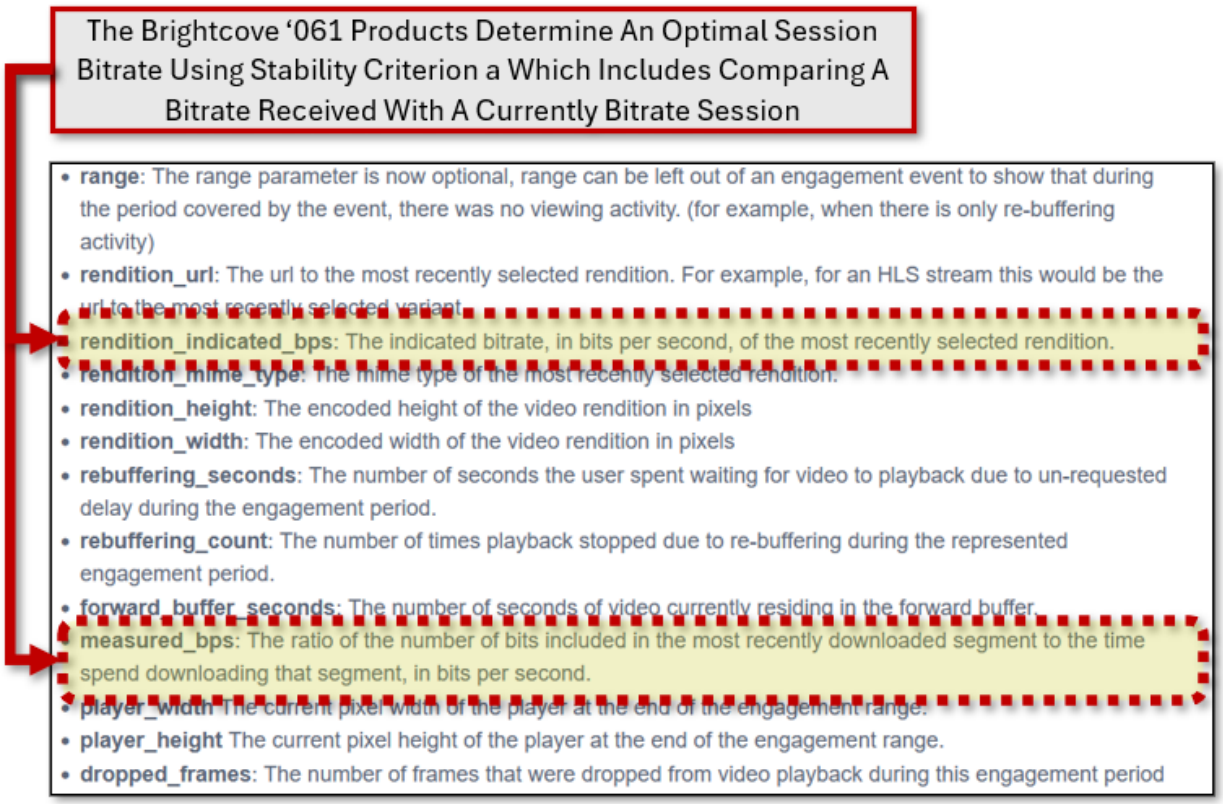
Transmuxing Guide, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-guides/creating-mp4-and-hls-outputs-together.html (last visited January 2025) (annotation added).

137. The Brightcove '061 Products, through Context Aware Encoding (CAE) and Dynamic Delivery functionality, determine an optimal session bitrate by utilizing estimated network conditions. Specifically, the Brightcove '061 Products calculate a stability criterion based on the estimated network conditions derived from viewer-specific data. For example, the Brightcove '061 Products evaluate factors such as buffering events and connection speed, as evidenced by the documentation's reference to "bandwidth currently available" and adjusting "decoder_bitrate_cap" and "decoder_buffer_size" and the ability to switch to a lower quality rendition during playback.



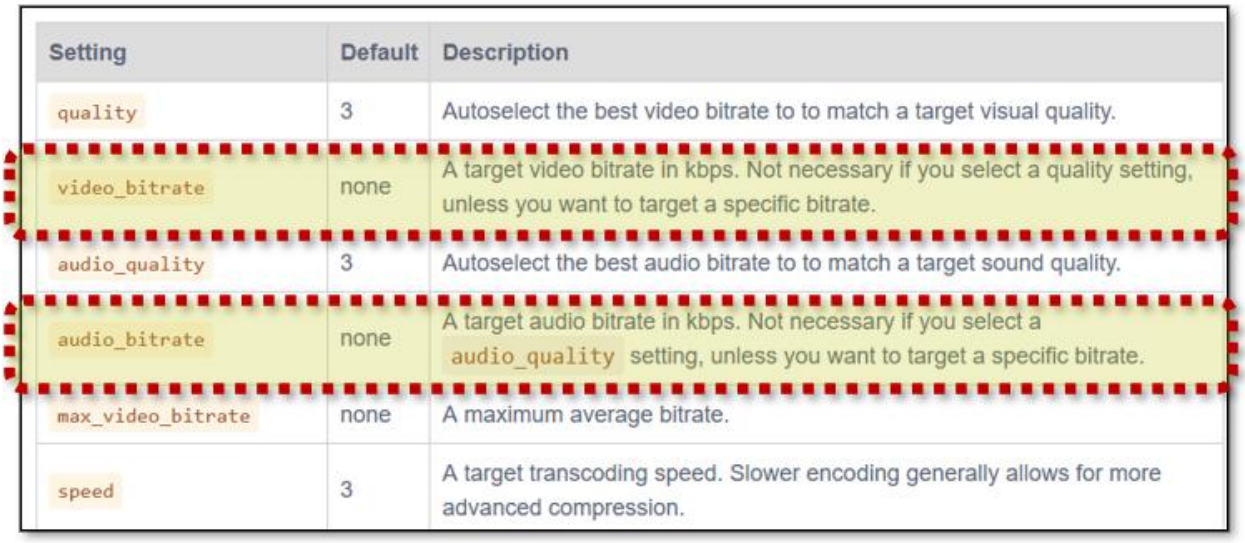
Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/general-information/overview-context-aware-encoding.html (last visited January 2025) (annotation added).

138. The Brightcove '061 Products perform comparisons to ascertain network stability and determine an optimal session bitrate. In particular, the Brightcove '061 Products compare the "time in transit" for media segments, approximated through metrics like "decoder_buffer_size", against acceptable thresholds. Additionally, the Brightcove '061 Products evaluate the relationship between "measured_bps" and "rendition_indicated_bps" to align the received bitrate with network conditions. This process is evident in the capability to switch to different quality renditions during playback, which demonstrates a determination of an optimal bitrate. If the Brightcove '061 Products deem the network stable—based on the ongoing throughput and buffer-state measurements the Brightcove '061 Products select a higher bitrate rendition. Conversely, if measured conditions indicate persistent congestion or slow delivery, the Brightcove '061 Products automatically adjust the bitrate downward.



Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (annotation added).

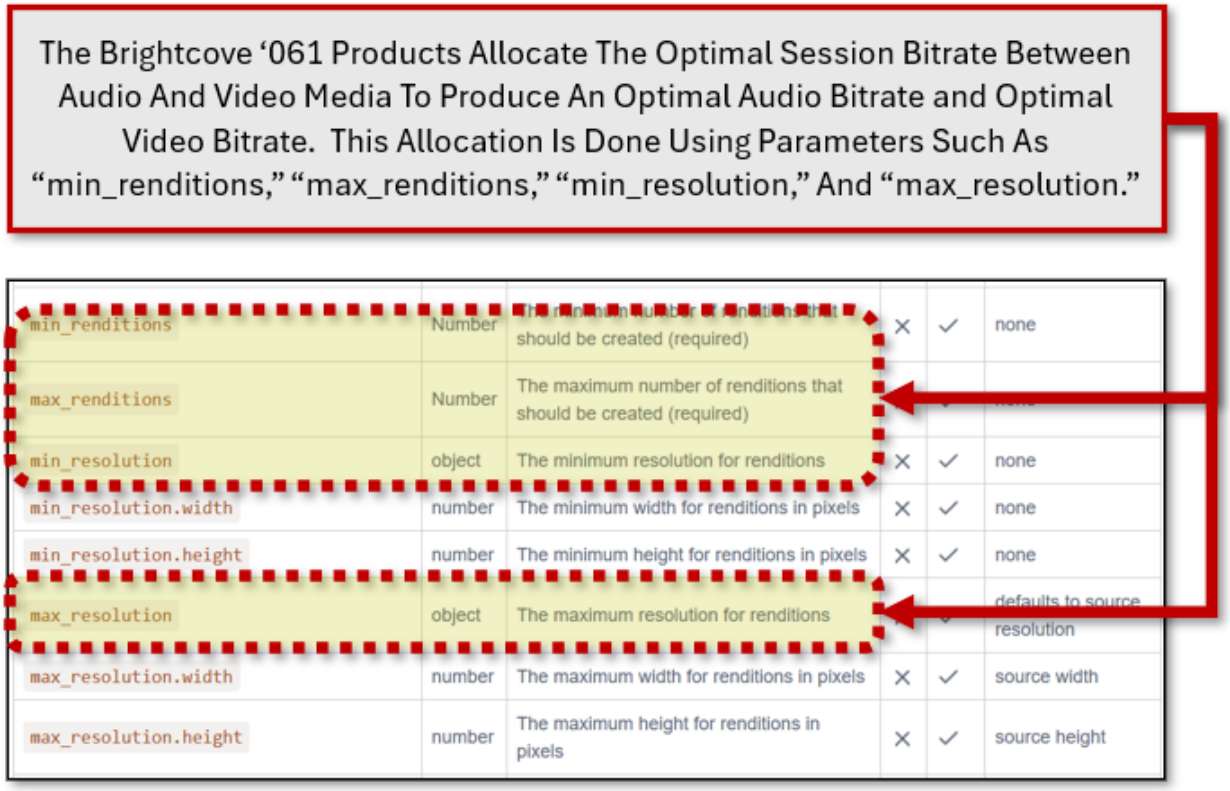
139. The Brightcove '061 Products allocate the optimal session bitrate between audio media data and video media data to produce an optimal audio bitrate and an optimal video bitrate. Specifically, the Brightcove '061 Products use Dynamic Delivery and Context Aware Encoding (CAE) to determine the best combination of audio and video renditions for a given piece of content and a client device's capabilities. For example, when creating ingest profiles, users can specify the desired audio and video bitrates (*e.g.*, through the audio_bitrate and video_bitrate settings), effectively expressing a preference for how the available bandwidth should be divided between audio and video streams.



Setting	Default	Description
quality	3	Autoselect the best video bitrate to to match a target visual quality.
video_bitrate	none	A target video bitrate in kbps. Not necessary if you select a quality setting, unless you want to target a specific bitrate.
audio_quality	3	Autoselect the best audio bitrate to to match a target sound quality.
audio_bitrate	none	A target audio bitrate in kbps. Not necessary if you select a audio_quality setting, unless you want to target a specific bitrate.
max_video_bitrate	none	A maximum average bitrate.
speed	3	A target transcoding speed. Slower encoding generally allows for more advanced compression.

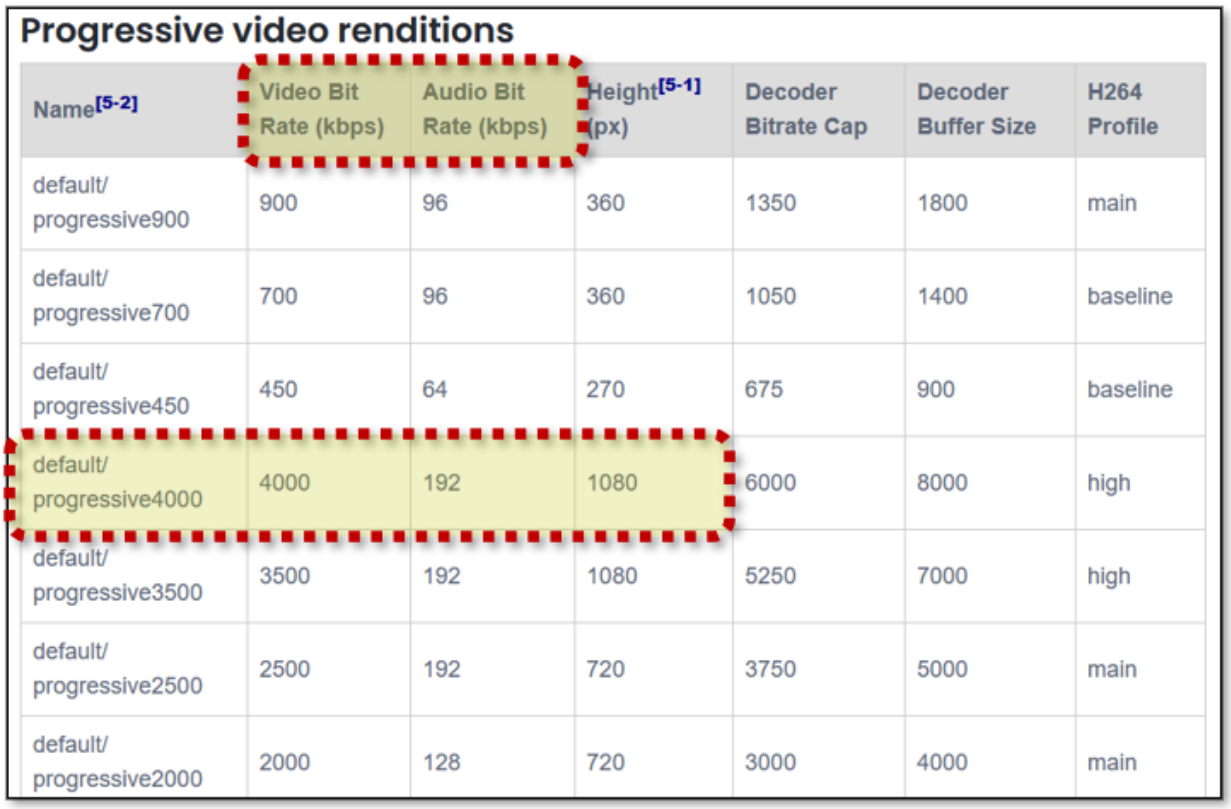
Encoding Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/quick-reference.html (last visited January 2025) (emphasis added).

140. The Brightcove '061 Products allocate the optimal session bitrate between audio and video media using parameters including "min_renditions," "max_renditions," "min_resolution," and "max_resolution" to manage media quality and bandwidth usage. Specifically, the Context Aware Encoding functionality in the Brightcove '061 Products analyzes source videos to build a custom bitrate ladder that accounts for the content's complexity, the device type, and the prevailing network conditions. For instance, the video_codec_options field within the dynamic_profile_options defines codec-specific constraints (e.g., min_bitrate and max_bitrate).



Ingest Profiles Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/ingest-profiles-api-fields-reference-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

141. The Brightcove '061 Products encode audio and video media data according to an optimal audio bitrate and an optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '061 Products encode audio and video media using a Dynamic Delivery ingest profiles wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '061 Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.

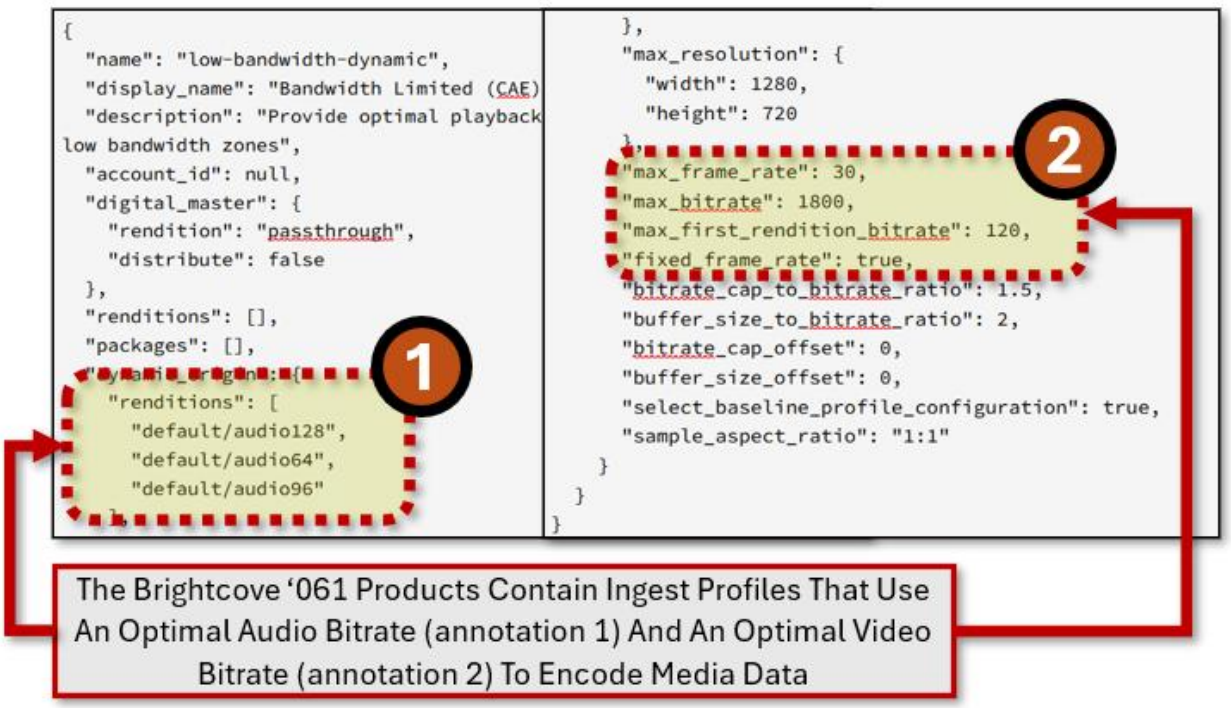


Progressive video renditions

Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

142. The Brightcove '061 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '061 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and "keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '061 Products set indicate minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

143. The Brightcove '061 Products provide the encoded audio and video data for transmission to the terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove '061 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove '061 Products generate manifests (such as HLS or DASH) that reference different video renditions, each encoded at specific bitrates.

144. Brightcove has directly infringed and continues to directly infringe the '061 Patent by, among other things, making, using, offering for sale, and/or selling technology comprising a method of adaptive bitrate management, including but not limited to the Brightcove '061 Products.

145. The Brightcove '061 Products are available to businesses and individuals throughout the United States.

146. The Brightcove ‘061 Products are provided to businesses and individuals located in this District.

147. By making, using, testing, offering for sale, and/or selling products and services comprising a method of adaptive bitrate management, including but not limited to the Brightcove ‘061 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘061 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

148. Brightcove has had knowledge of the ‘061 Patent and its infringement of the ‘061 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the ‘061 Patent is well-known within the industry as demonstrated by multiple citations to the ‘061 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the ‘061 Patent despite knowing of the ‘061 Patent and its infringement thereof. Brightcove is infringing the ‘061 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

149. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘061 Patent.

150. As a result of Brightcove’s infringement of the ‘061 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,987,285

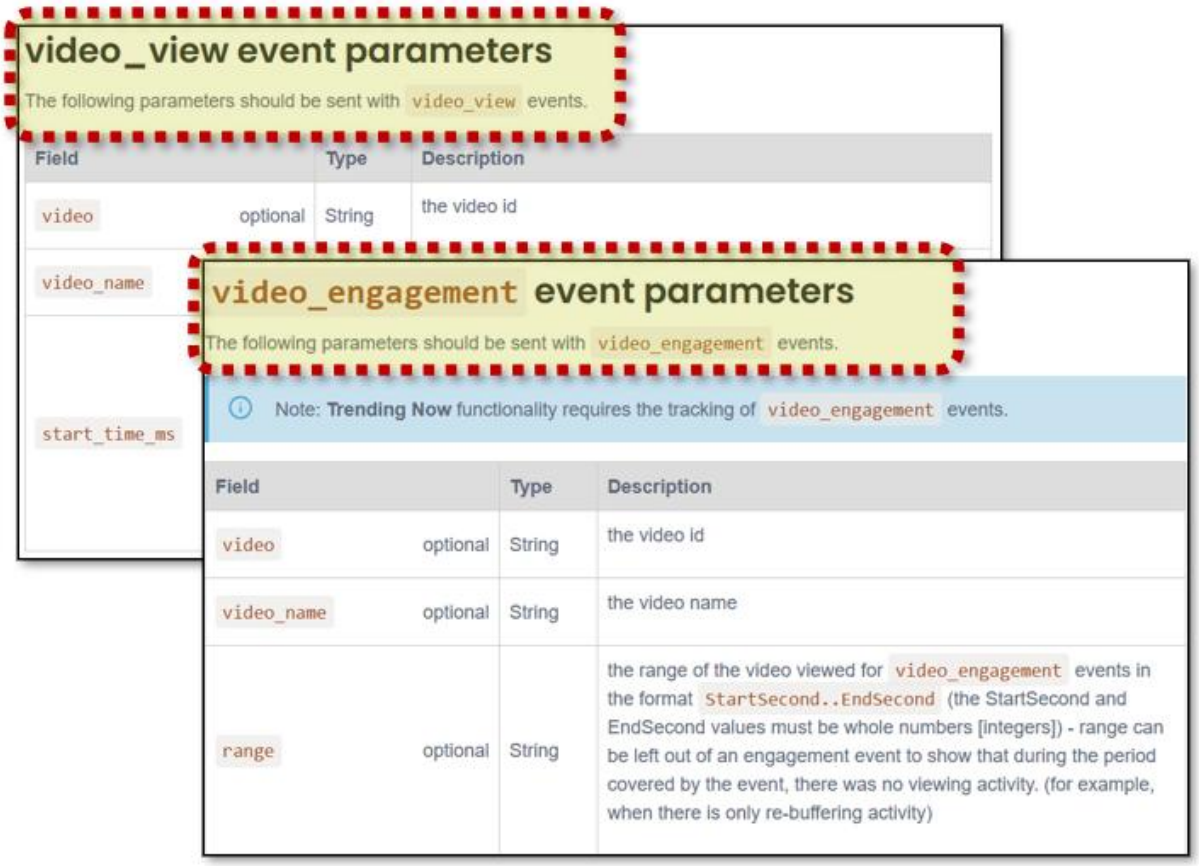
151. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

152. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for adaptive bitrate management for streaming media over packet networks.

153. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality (collectively, the "Brightcove '285 Product(s)").

154. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '285 Products in regular business operations.

155. The Brightcove '285 Products a receiver report from a terminal. The Brightcove '285 Products obtain receiver reports from a terminal (*e.g.*, Brightcove Player or the Brightcove Native SDKs). Specifically, the Brightcove '285 Products gather a range of feedback metrics that describe how the transmitted media is being received and played back. For example, the Brightcove '285 Products capture events such as video_view, video_engagement, and error events. This data exchange is enabled by the Brightcove '285 Products through parameters like event=video_view in API requests.



video_view event parameters

The following parameters should be sent with video_view events.

Field		Type	Description
video	optional	String	the video id
video_name			
start_time_ms			

video_engagement event parameters

The following parameters should be sent with video_engagement events.

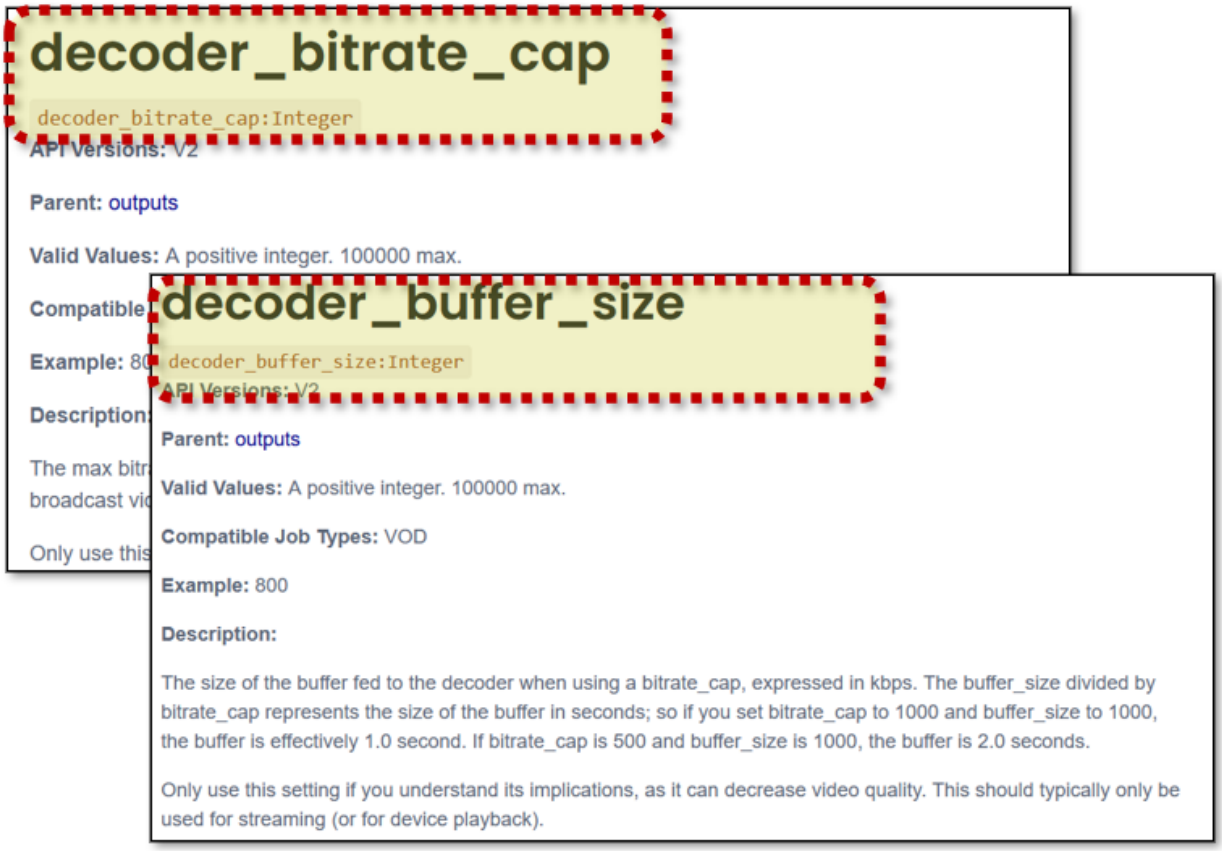
Note: **Trending Now** functionality requires the tracking of video_engagement events.

Field		Type	Description
video	optional	String	the video id
video_name	optional	String	the video name
range	optional	String	the range of the video viewed for video_engagement events in the format StartSecond..EndSecond (the StartSecond and EndSecond values must be whole numbers [integers]) - range can be left out of an engagement event to show that during the period covered by the event, there was no viewing activity. (for example, when there is only re-buffering activity)

Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

156. The Brightcove '285 Products receive detailed information about playback sessions, including the session identifier (a unique string representing a single viewing session). Further, the Brightcove '285 Products receive receiver reports including in the form of data showing when a viewer interacts with a video player, such as starting or pausing playback. For instance, the Brightcove '285 Products capture events like play_request and video_engagement, which include metrics like start time and duration of viewing. These reports enable the Brightcove '285 Products to estimate network conditions by comparing the desired bitrate with what can be successfully delivered, enabling video delivery optimization. The Brightcove '285 Products receive receiver reports and use that data to make adjustments in media delivery, as reflected in

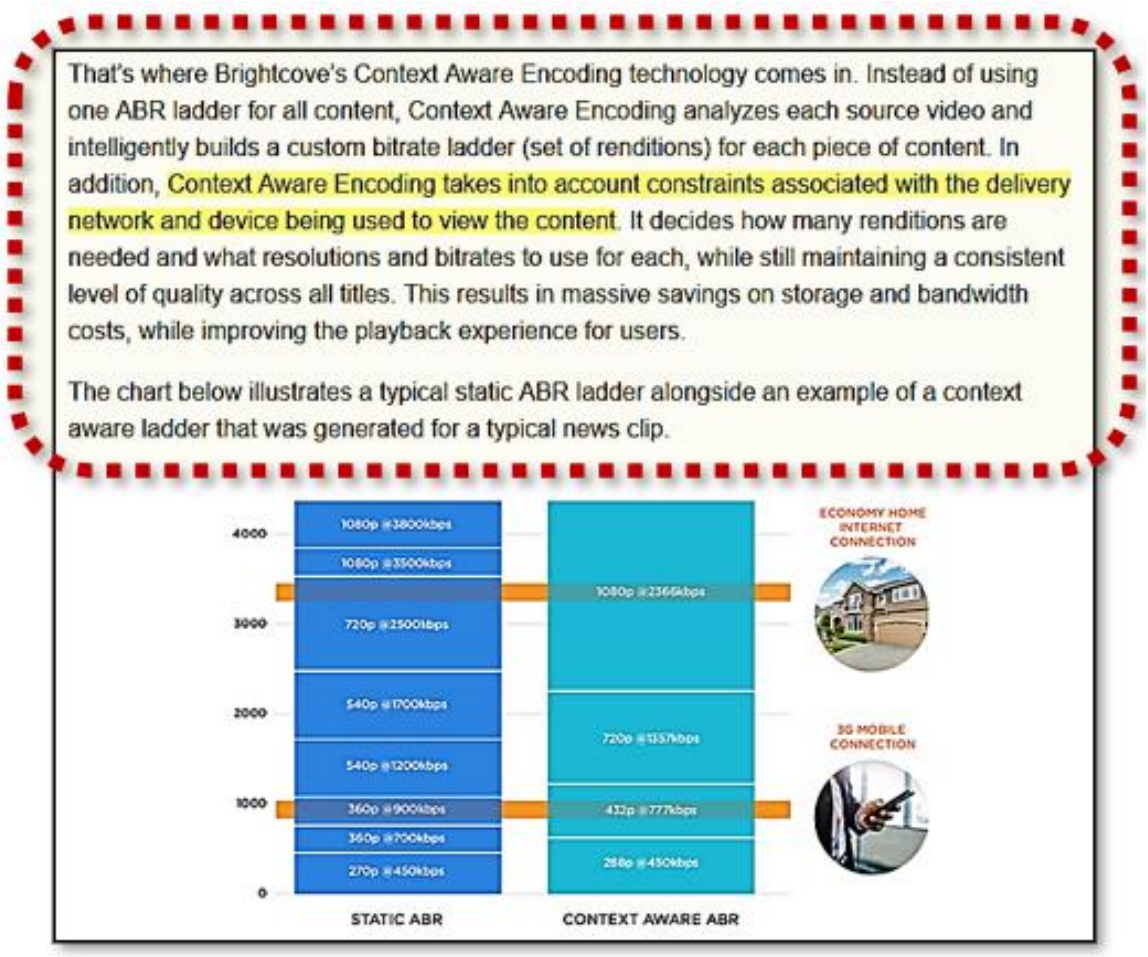
adjustments to decoder_bitrate_cap and decoder_buffer_size as shown in the below excerpt from Brightcove documentation of the Brightcove '285 Products.



Rate Control Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-rate-control.html (last visited January 2025) (emphasis added).

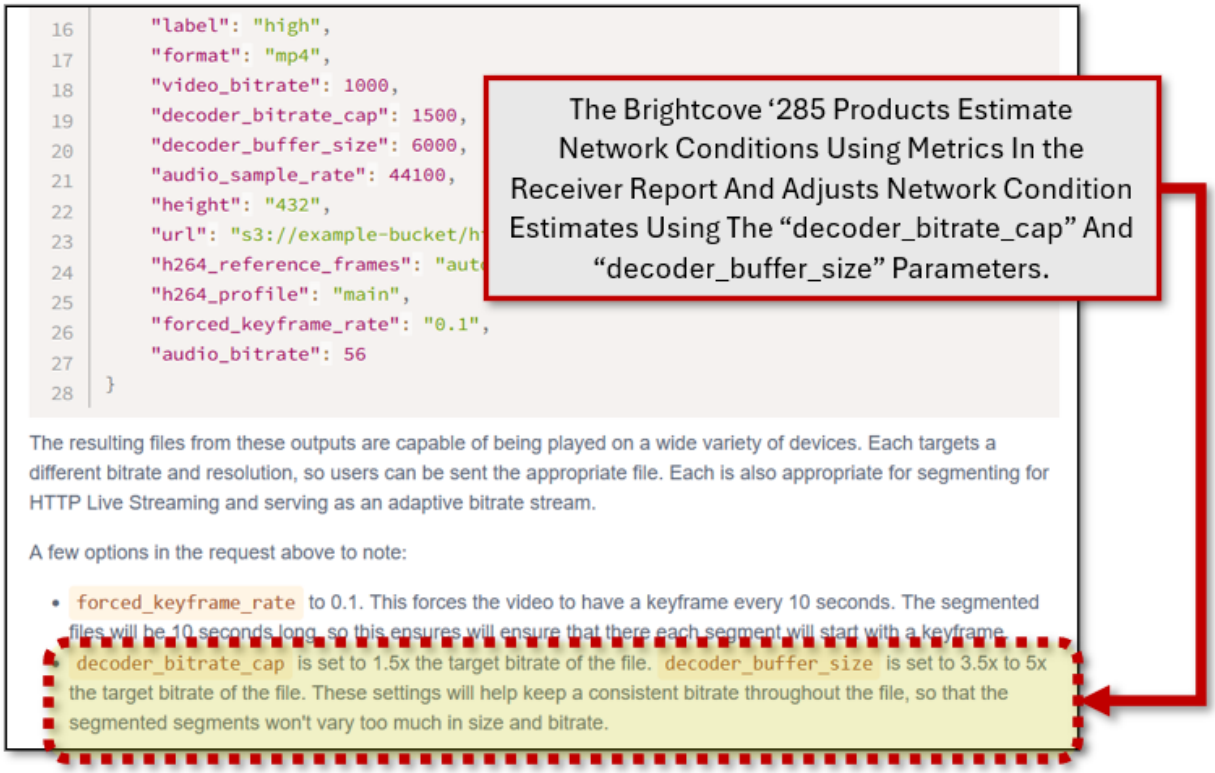
157. The Brightcove '285 Products estimate one or more network conditions of a media network using the receiver report. Specifically, the Brightcove '285 Products use feedback data from both web players and native SDK players, which includes metrics such as bandwidth, buffering events, and device capabilities. For example, the Brightcove '285 Products receive video_view event data that includes the video_duration and time, which can be used to assess playback performance. In addition, the Brightcove '285 Products receive video_engagement event data which provides rebuffering_seconds and rebuffering_count metrics which are used to estimate

network conditions. Further, Brightcove's Context Aware Encoding (CAE) and Dynamic Delivery functionality in the Brightcove '285 Products utilize receiver report data (feedback data) to set video encoding and delivery parameters. The Brightcove '285 Products' documentation states that Brightcove's CAE "takes into account constraints associated with the delivery network and device being used to view the content," and that Brightcove Dynamic Delivery uses information about "the bandwidth currently available, buffer fullness, and the size of the playback window."



Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (emphasis added).

158. The Brightcove ‘285 Products estimate network conditions by analyzing data received from an interface. Specifically, the Brightcove ‘285 Products inspect metrics such as segment download duration, player buffer fullness, and re-buffering frequency. For example, when feedback data showing slower segment downloads or buffer depletion events is received by the Brightcove ‘285 Products the products estimate that the available bandwidth is lower and adjust video delivery. The Brightcove ‘285 Products adjust estimates of network conditions by referencing parameters like “decoder_bitrate_cap” and “decoder_buffer_size,” which reflect throughput and latency. Specifically, the Brightcove ‘285 Products track how rapidly segments are retrieved and how smoothly the playback buffer is replenished, approximating network conditions. For instance, if the observed bandwidth comfortably exceeds the current bitrate demands, the Brightcove ‘285 Products interpret that capacity as indicative of stable network conditions. By correlating feedback metrics with known encoding thresholds, the Brightcove ‘285 Products estimate network conditions such as available bandwidth and overall link stability.

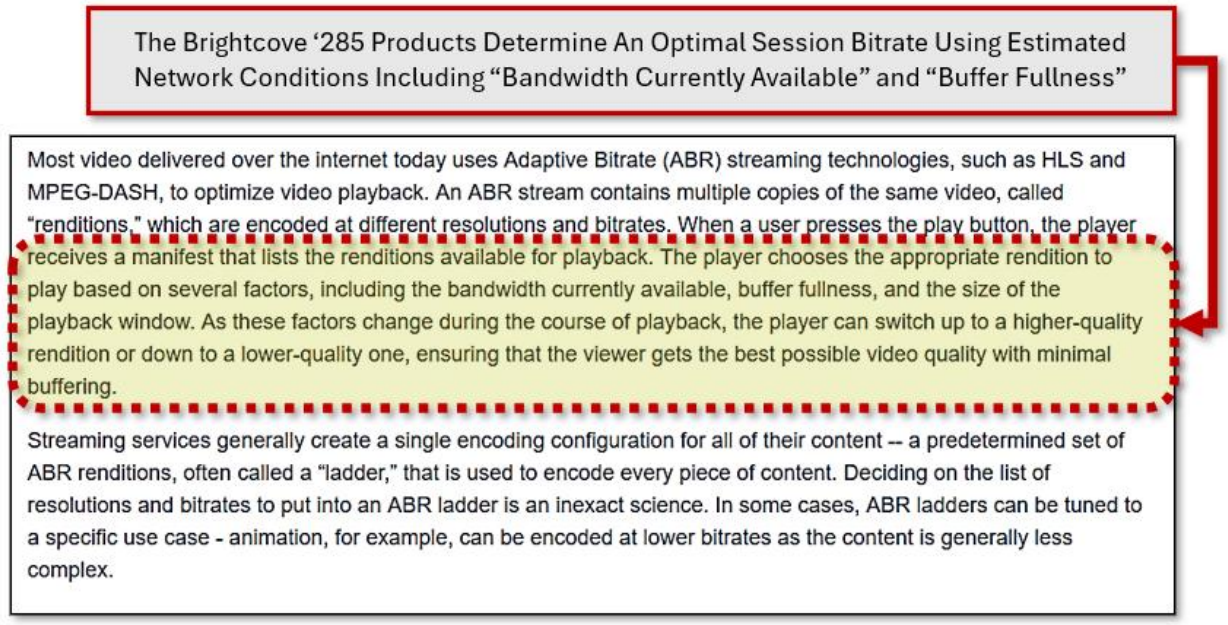


Transmuxing Guide, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-guides/creating-mp4-and-hls-outputs-together.html (last visited January 2025) (annotation added).

159. The Brightcove '285 Products determine an optimal session bitrate using the estimated one or more network conditions, wherein determining the optimal session bitrate further comprises (1) determining stability criterion using the estimated one or more network conditions, wherein determining stability criterion includes at least one of (a) comparing a media time in transit and a round trip time estimate and (b) comparing a bitrate received with a current bitrate session; (2) determining the stability of the media network; and (3) providing the optimal session bitrate based at least in part on the media-network-stability determination.

160. The Brightcove '285 Products, through Context Aware Encoding (CAE) and Dynamic Delivery functionality, determine an optimal session bitrate by utilizing estimated network conditions. Specifically, the Brightcove '285 Products calculate a stability criterion based on the estimated network conditions derived from viewer-specific data. For example, the

Brightcove '285 Products evaluate factors such as buffering events and connection speed, as evidenced by the documentation's reference to "bandwidth currently available" and adjusting "decoder_bitrate_cap" and "decoder_buffer_size" and the ability to switch to a lower quality rendition during playback.



Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/general-information/overview-context-aware-encoding.html (last visited January 2025) (annotation added).

161. The Brightcove '285 Products perform comparisons to ascertain network stability and determine an optimal session bitrate. In particular, the Brightcove '285 Products compare the "time in transit" for media segments, approximated through metrics like "decoder_buffer_size", against acceptable thresholds. Additionally, the Brightcove '285 Products evaluate the relationship between "measured_bps" and "rendition_indicated_bps" to align the received bitrate with network conditions. This process is evident in the capability to switch to different quality renditions during playback, which demonstrates a determination of an optimal bitrate. If the Brightcove '285 Products deem the network stable—based on the ongoing throughput and buffer-

state measurements the Brightcove '285 Products select a higher bitrate rendition. Conversely, if measured conditions indicate persistent congestion or slow delivery, the Brightcove '285 Products automatically adjust the bitrate downward.

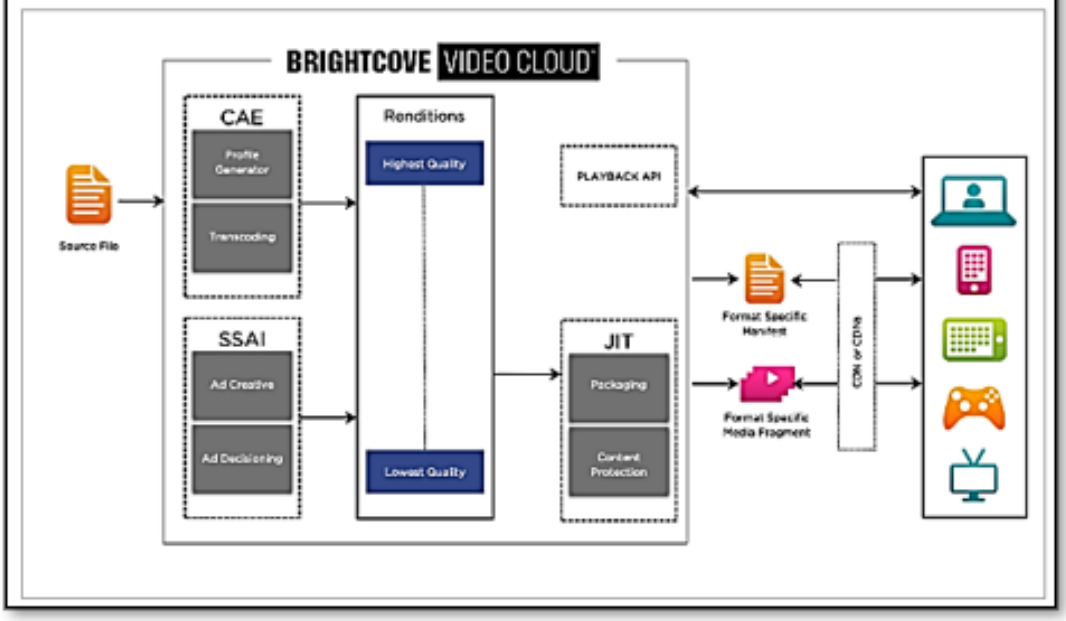
Overview: Data Collection API v2, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/data-collection/getting-started/overview-data-collection-api-v2.html (last visited January 2025) (annotation added).

162. The Brightcove '285 Products provide an optimal session bitrate by first assessing streaming metrics, such as measured bandwidth and buffer health, and then selecting the corresponding rendition for playback. Specifically, the Brightcove '285 Products use adaptive-bitrate (ABR) functions to calculate these parameters. For example, the Brightcove '285 Products examine segment download durations and rebuffer events to determine whether the network can sustain a higher or lower bitrate. Once the evaluation deems a particular bitrate "optimal," the Brightcove '285 Products stores this bitrate selection for subsequent segment requests. The

Brightcove ‘285 Products provide the chosen session bitrate to the terminal by making available the rendition deemed best for current conditions. In addition, the Brightcove ‘285 Products use settings such as “decoder_bitrate_cap” and “decoder_buffer_size” to align encoding output and playback requests. The Brightcove ‘285 Products provide the optimal session bitrate by packaging content in real-time to meet the specific format requirements. This is evidenced by Brightcove documentation which states, “Dynamic Delivery then uses this information to process the different quality levels in real-time so that they are in the right format for the device requesting the content.” For example, the Brightcove ‘285 Products select an HLS stream with a particular bitrate and resolution if the detected network conditions indicate that it is the most suitable option.

Context Aware Encoding is a feature of Dynamic Delivery. Context Aware Encoding analyzes each source video and intelligently builds a custom bitrate ladder (set of renditions) for each piece of content. When a viewer presses play, Video Cloud will identify the requesting device so that we know what kind of media format it is expecting (codecs, how it needs to be packaged for delivery, what kind of DRM it uses, what closed captions it needs, which audio language, etc.). Dynamic Delivery then uses this information to process the different quality levels in real-time so that they are in the right format for the device requesting the content.

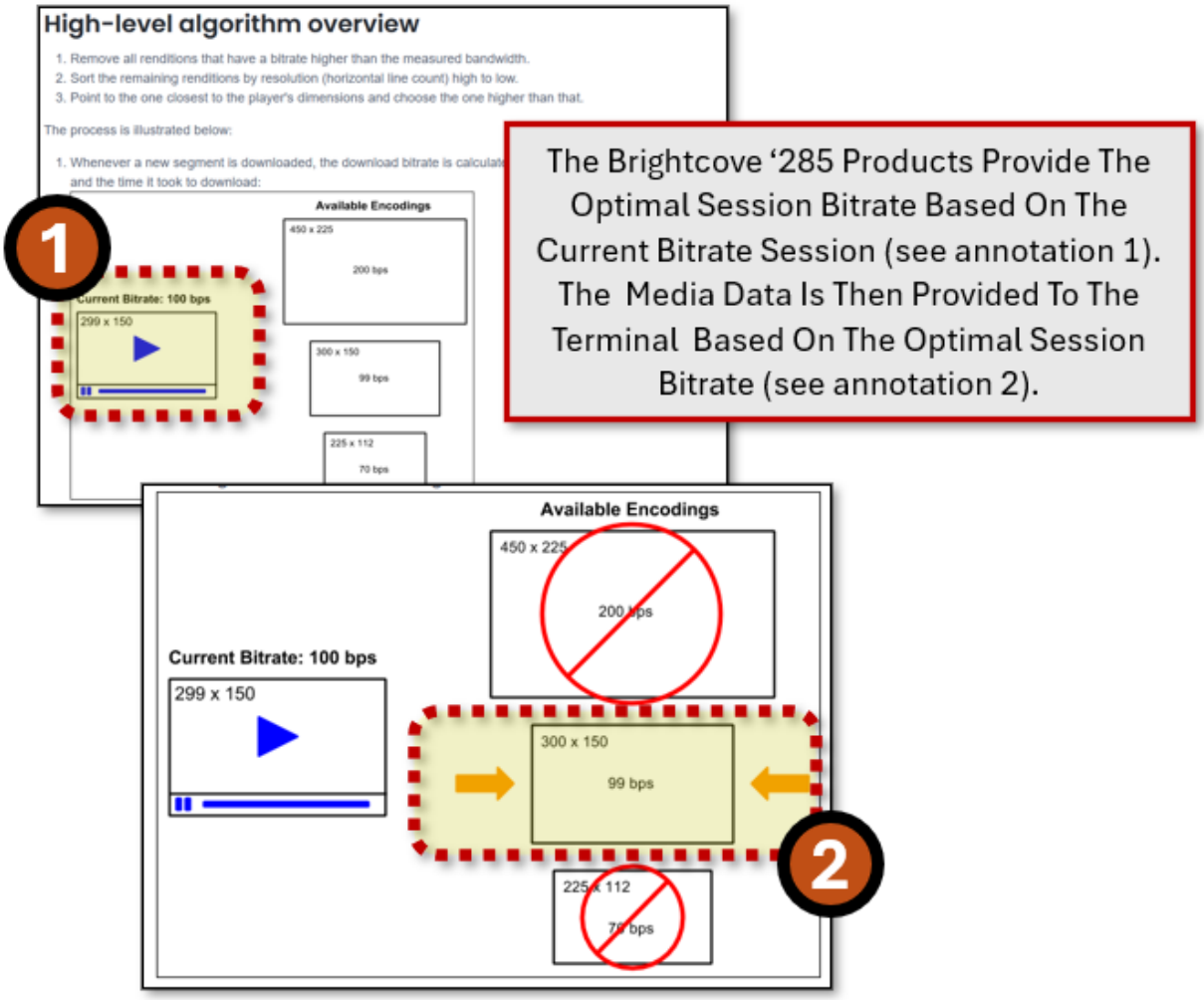
A diagram illustrating the Dynamic Delivery architecture is shown below. For more information on Dynamic Delivery, see Overview of Dynamic Delivery.



Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/general/overview-context-aware-encoding.html (last visited January 2025) (emphasis added).

163. The Brightcove '285 Products provide media data to the terminal according to the optimal session bitrate. Specifically, once the optimal session bitrate is determined by the Brightcove '285 Products through a stability determination of the network, the Brightcove '285 Products deliver the corresponding media segment(s). For instance, when utilizing Dynamic Delivery, the Brightcove '285 Products generate manifests (such as HLS or DASH) that reference different video renditions, each encoded at a specific bitrate and resolution. As shown in the below

excerpts from Brightcove documentation this selection is based on a network stability determination based on comparing a bitrate received with a current bitrate session.

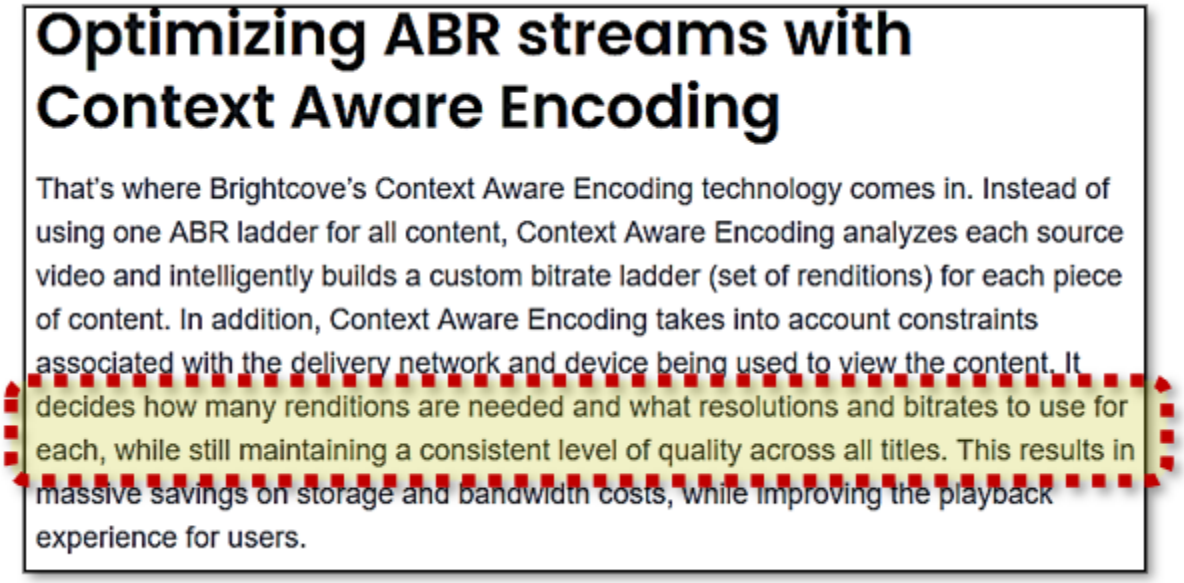


Determining Which Rendition Will Play, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://player.support.brightcove.com/playback/determining-which-rendition-will-play.html (last visited January 2025) (annotation added).

164. The Brightcove '285 Products provide media data to the terminal according to the optimal session bitrate. The Brightcove '285 Products perform the continued delivery of media at the chosen bitrate through manifest updates and player instruction. In addition, the Brightcove '285 Products use parameters including "decoder_bitrate_cap" and "decoder_buffer_size" to confirm that each requested segment remains within the established bitrate. If the Brightcove '285

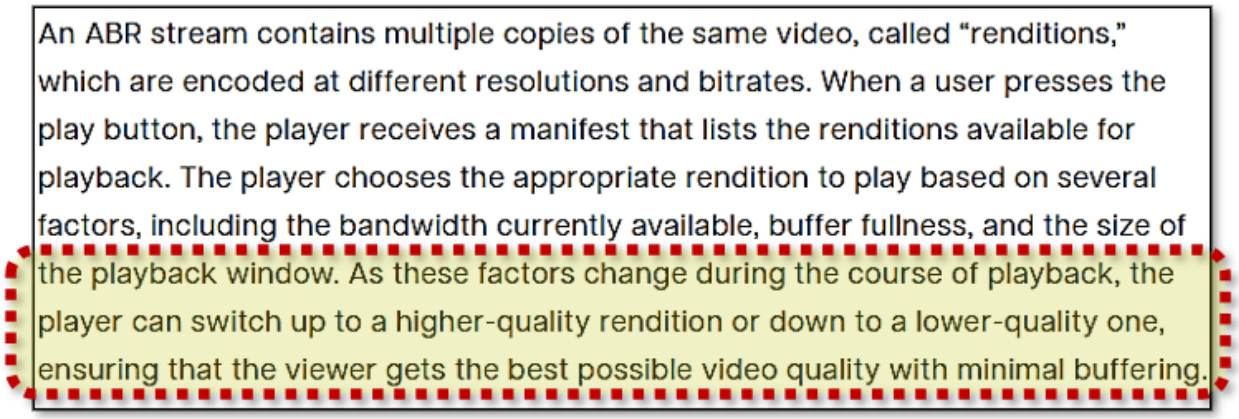
Products determine that network conditions accommodate the selected bitrate, the Brightcove '285 Products request segments that match this bitrate tier (transmitting media data at the optimal bitrate). The Brightcove '285 Products maintain session stability by adhering to the optimal bitrate once it is selected, only adjusting upward or downward when updated bandwidth estimations or buffer thresholds indicate a necessary change. Hence, the Brightcove '285 Products transmit media content to the terminal at the optimal bitrate established by the ABR algorithms. In addition, the Brightcove '285 Products utilize ABR algorithms, within the Context Aware Encoding (CAE) framework, to select media segments based on real-time feedback. If network conditions fluctuate, the Brightcove '285 Products transition between different renditions.

165. The Brightcove '285 Products maintain or incrementally increase the current session bitrate when the stability of the media network is deemed normal. Specifically, Brightcove's adaptive bitrate streaming logic, which is integrated in Brightcove's Dynamic Delivery and Context Aware Encoding (CAE), monitors network conditions and adjusts the video quality. As detailed in Brightcove documentation, the system evaluates factors such as available bandwidth, buffer fullness, and the size of the playback window to determine the optimal bitrate. For instance, the "Context Aware Encoding" feature "decides how many renditions are needed and what resolutions and bitrates to use for each, while still maintaining a consistent level of quality across all titles."



Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://beacon.support.brightcove.com/references/overview-context-aware-encoding.html (last visited January 2025) (emphasis added).

166. The Brightcove '285 Products through Dynamic Delivery and Context Aware Encoding (CAE) functionality, maintain or incrementally increases the current bitrate when the stability of the media network is considered normal. Specifically, the Brightcove '285 Products evaluate network conditions and adjust video quality. For instance, Brightcove documentation states "as these factors change during the course of playback, the player can switch up to a higher-quality rendition or down to a lower-quality one, ensuring that the viewer gets the best possible video quality with minimal buffering." In addition, the Brightcove '285 Products check rebuffering frequency, throughput consistency, and historical download times to confirm whether higher bitrate renditions can be used. For example, when throughput metrics consistently exceed the demands of the active bitrate, the Brightcove '285 Products transmit data at a higher bitrate.



Context-Aware Encoding: Improve Video Quality and Cut Costs, BRIGHTCOVE WEBSITE, *available at*: https://www.brightcove.com/resources/blog/context-aware-encoding-improves-video-quality-while-cutting-costs/ (last visited January 2025) (emphasis added).

167. Brightcove has directly infringed and continues to directly infringe the '285 Patent by, among other things, making, using, offering for sale, and/or selling technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Brightcove '285 Products.

168. The Brightcove '285 Products are available to businesses and individuals throughout the United States.

169. The Brightcove '285 Products are provided to businesses and individuals located in this District.

170. By making, using, testing, offering for sale, and/or selling products and services comprising technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Brightcove '285 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '285 Patent, including at least claim 2 pursuant to 35 U.S.C. § 271(a).

171. Brightcove has had knowledge of the '285 Patent and its infringement of the '285 Patent since at least service of the Original Complaint in this action or shortly thereafter.

Moreover, the '285 Patent is well-known within the industry as demonstrated by multiple citations to the '285 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '285 Patent despite knowing of the '285 Patent and its infringement thereof. Brightcove is infringing the '285 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

172. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '285 Patent.

173. As a result of Brightcove's infringement of the '285 Patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 7,991,904

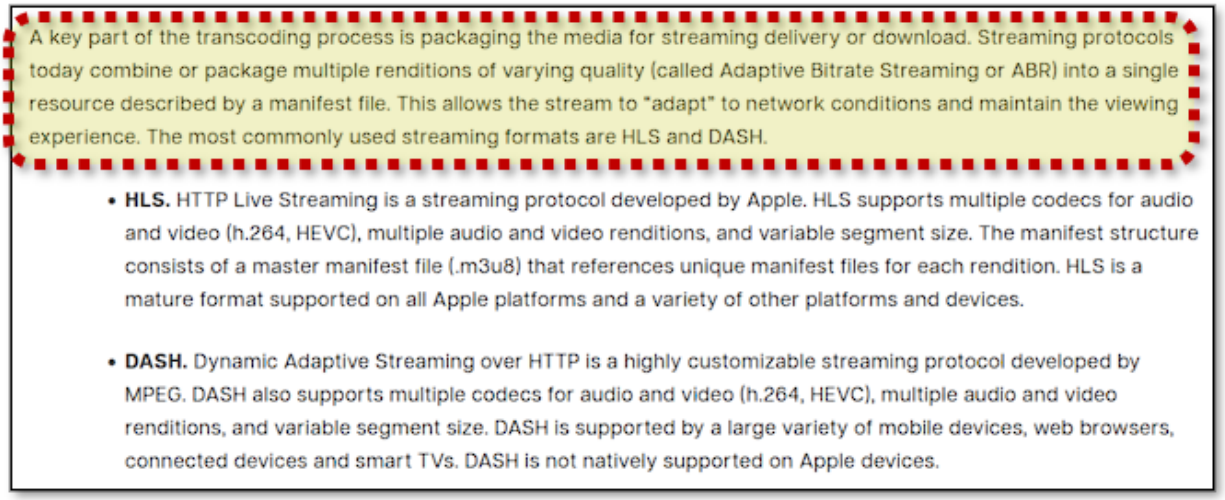
174. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

175. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for adaptive bitrate management for streaming media over packet networks.

176. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '904 Product(s)").

177. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '904 Products in regular business operations.

178. The Brightcove '904 Products receive an optimal session bitrate based on information provided by a transport control protocol (TCP) acknowledgement. Specifically, the Brightcove '904 Products use adaptive bitrate (ABR) functionality across HLS, MPEG-DASH, and RTMPS protocols, wherein each segment request is based on network feedback. For example, the platform initially delivers video segments according to a manifest file and subsequently adjusts the requested bitrate upon detecting TCP acknowledgements that signal successful or delayed packet delivery. As shown in the below excerpt from Brightcove documentation this enables the Brightcove '904 Products to estimate network conditions and receive an optimal session bitrate based on these network conditions.


A key part of the transcoding process is packaging the media for streaming delivery or download. Streaming protocols today combine or package multiple renditions of varying quality (called Adaptive Bitrate Streaming or ABR) into a single resource described by a manifest file. This allows the stream to "adapt" to network conditions and maintain the viewing experience. The most commonly used streaming formats are HLS and DASH.

- **HLS.** HTTP Live Streaming is a streaming protocol developed by Apple. HLS supports multiple codecs for audio and video (h.264, HEVC), multiple audio and video renditions, and variable segment size. The manifest structure consists of a master manifest file (.m3u8) that references unique manifest files for each rendition. HLS is a mature format supported on all Apple platforms and a variety of other platforms and devices.

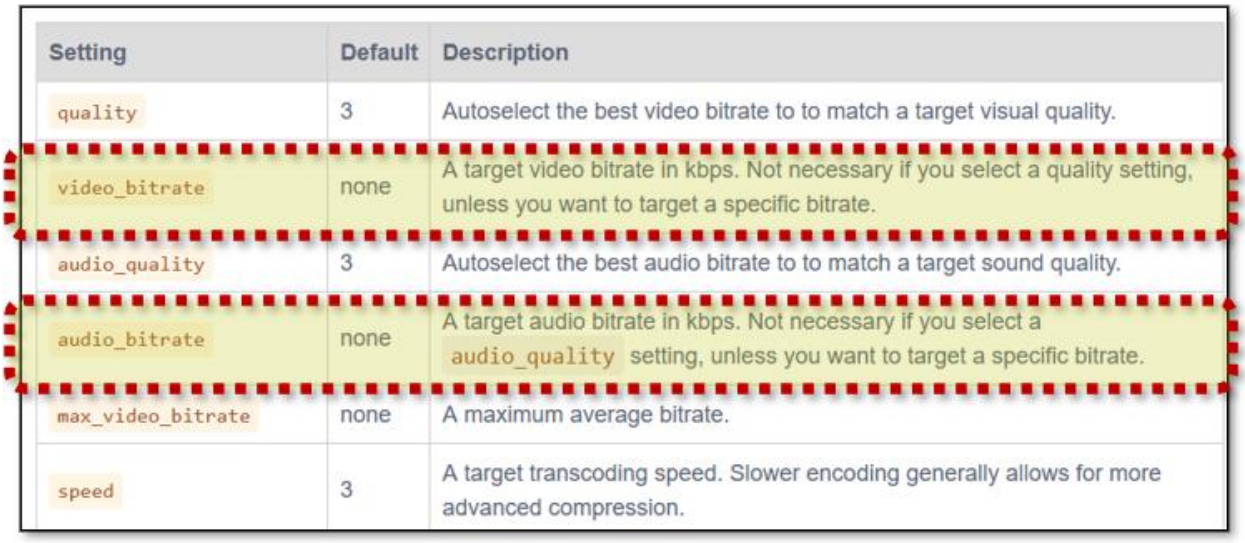
- **DASH.** Dynamic Adaptive Streaming over HTTP is a highly customizable streaming protocol developed by MPEG. DASH also supports multiple codecs for audio and video (h.264, HEVC), multiple audio and video renditions, and variable segment size. DASH is supported by a large variety of mobile devices, web browsers, connected devices and smart TVs. DASH is not natively supported on Apple devices.

Video Transcoding: The Basics and Advanced Solutions, BRIGHTCOVE WEBSITE, *available at*: https://www.brightcove.com/fr/resources/blog/video-transcoding-dynamic-ingest-and-apis-overview/ (last visited January 2025) (emphasis added).

179. The Brightcove '904 Products receive throughput and congestion information from TCP acknowledgement packets, which enable the receipt and identification of an optimal bitrate. In addition, the Brightcove '904 Products receive and process network metrics (*e.g.*, packet

delivery times, packet loss indicators, etc.) to determine a terminal's available bandwidth. Where the received metrics show reduced bandwidth or elevated latency, the Brightcove '904 Products request a lower-bitrate segment. Further, the Brightcove '904 Products use a feedback loop system wherein TCP acknowledgment data from the client device informs the selection of the optimal session bitrate from renditions encoded at varying bitrates. The Brightcove '904 Products analyze TCP acknowledgments to evaluate network throughput and stability and determine which bitrate variant is optimal. For instance, when TCP acknowledgments indicate network congestion through increased packet loss, the Brightcove '904 Products adjusts to a lower bitrate stream.

180. The Brightcove '904 Products allocate the optimal session bitrate between audio and video media to produce an optimal audio bitrate and an optimal video bitrate, wherein allocating the optimal session bitrate between audio and video media is based at least in part on privileging either the audio media or the video media over the other. Specifically, the Brightcove '904 Products use Dynamic Delivery and Context Aware Encoding to determine the best combination of audio and video renditions for a given piece of content and a client device's capabilities. For example, when creating ingest profiles, users can specify the desired audio and video bitrates (e.g., through the audio_bitrate and video_bitrate settings), effectively expressing a preference for how the available bandwidth should be divided between audio and video streams.



Setting	Default	Description
quality	3	Autoselect the best video bitrate to to match a target visual quality.
video_bitrate	none	A target video bitrate in kbps. Not necessary if you select a quality setting, unless you want to target a specific bitrate.
audio_quality	3	Autoselect the best audio bitrate to to match a target sound quality.
audio_bitrate	none	A target audio bitrate in kbps. Not necessary if you select a audio_quality setting, unless you want to target a specific bitrate.
max_video_bitrate	none	A maximum average bitrate.
speed	3	A target transcoding speed. Slower encoding generally allows for more advanced compression.

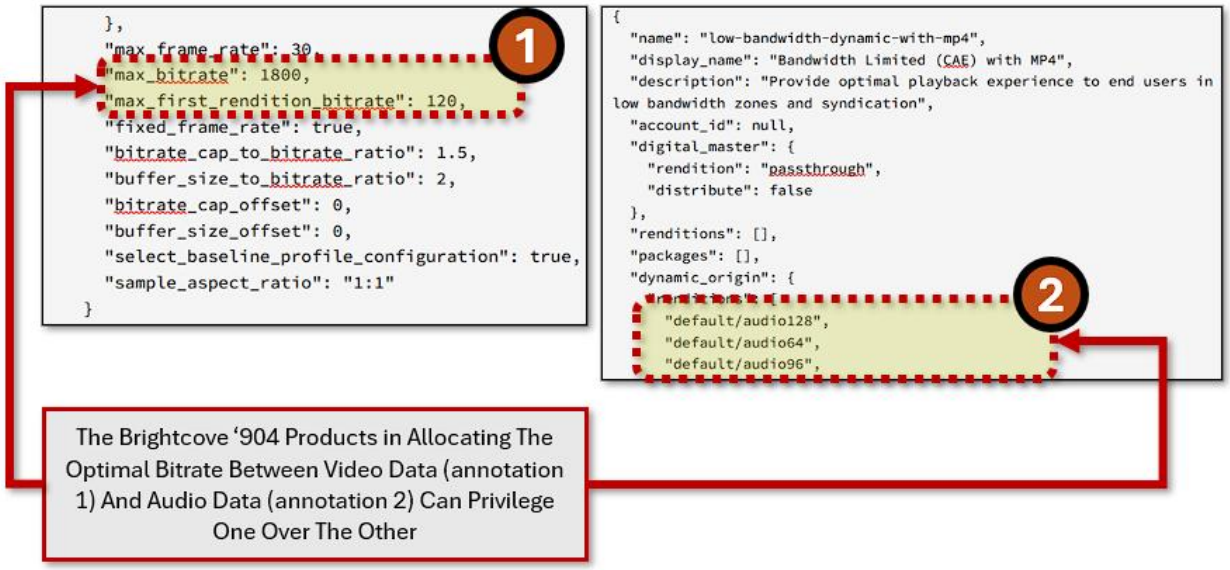
Encoding Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/quick-reference.html (last visited January 2025) (emphasis added).

181. The Brightcove '904 Products allocate the optimal session bitrate between audio and video data using parameters including "min_renditions," "max_renditions," "min_resolution," and "max_resolution" – privileging either the audio media or the video media over the other. Specifically, the Context Aware Encoding functionality in the Brightcove '904 Products analyzes audio and video data and constructs a bitrate ladder that accounts for the content's complexity, the device type, and the prevailing network conditions. For instance, the video_codec_options field within the dynamic_profile_options defines codec-specific constraints (e.g., min_bitrate and max_bitrate).

Ingest Profiles Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/ingest-profiles-api-fields-reference-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

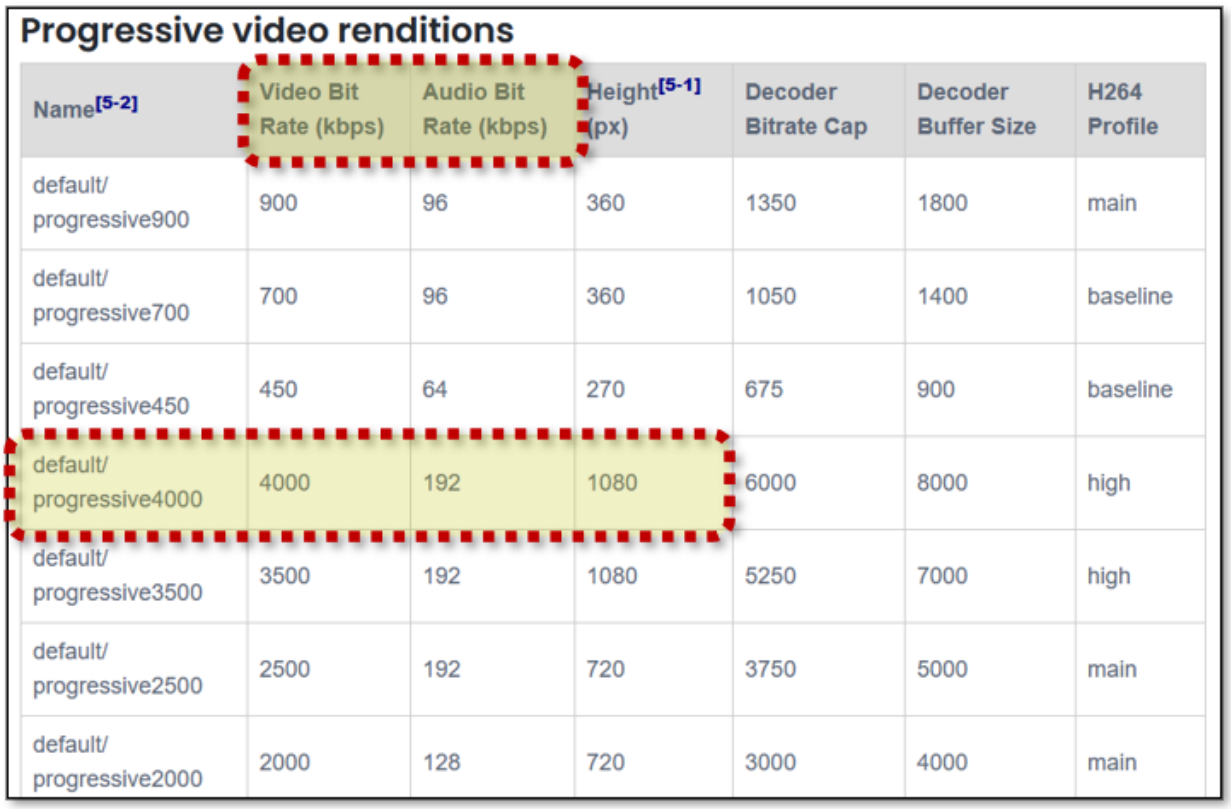
182. The Brightcove '904 Products allocate the optimal session bitrate between audio and video data such that either the audio or video data are privileged. Specifically, the Brightcove '904 Products allocate a higher bitrate to either the audio or the video media by generating separate audio-only renditions, alongside video renditions. Further, the Brightcove '904 Products allocate the optimal session bitrate using Context Aware Encoding functionality that generates audio-only renditions with bitrates of 64, 96, 128, or 192 kbps video renditions at varying bitrates. The ingest profiles field "audio_bitrate" in the Brightcove '904 Products sets the target bitrate for the audio data and can be set above or below the bitrate of the video data – thus privileging the audio data over the video data. The "low-bandwidth-dynamic-with-mp4" ingestion profile allocates the audio bitrate at either 128 Kbps, 64 Kbps, or 96 Kbps and sets the maximum first rendition bitrate for

video at 120 Kbps. The below excerpt from Brightcove documentation shows privileging either audio data or video data depending on the selection.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

183. The Brightcove '904 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '904 Products encode audio and video media using Dynamic Delivery ingest profiles wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '904 Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.



Progressive video renditions

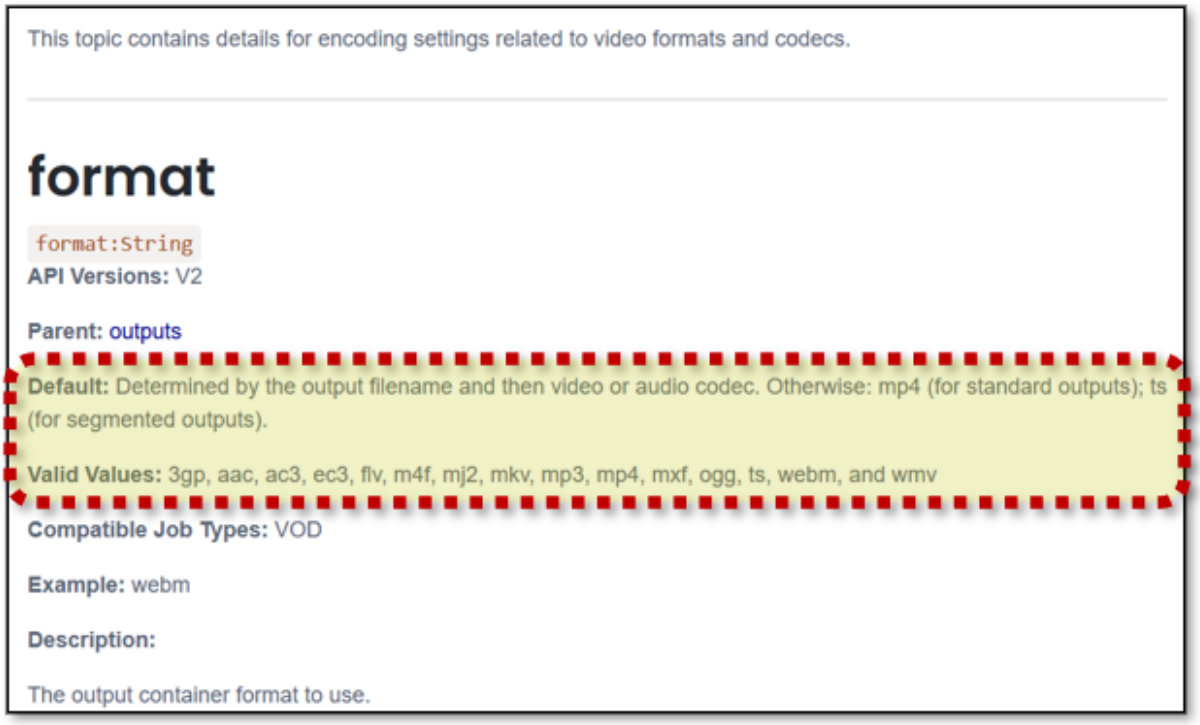
Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

184. The Brightcove '904 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '904 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and "keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '904 Products set minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.

185. The Brightcove ‘904 Products multiplex the encoded audio and video media data. Specifically, the Dynamic Delivery system within the Brightcove ‘904 Products utilizes a just-in-time packaging approach, where encoded audio and video renditions are combined into a single bitstream. For example, when a request is made for a video, the Brightcove ‘904 Products identify the appropriate audio and video renditions based on the selected ingest profile and package them into a single container such as MP4 or MKV.

186. The Brightcove ‘904 Products multiplex the encoded audio and video data by combining the audio and video tracks into a single container as part of its distribution process. Specifically, Brightcove ‘904 Products encode audio and video streams separately and then apply a containerization format, such as MPEG-4 or fragmented MP4 (fMP4), that merges the audio and video bitstreams. For example, Brightcove’s workflow includes using internal packaging functions that attach the encoded audio track alongside the encoded video track within the same file structure.



Format/Codecs Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/formats-codecs/encoding-settings-format-and-codecs.html (last visited January 2025) (emphasis added).

187. The Brightcove '904 Products provide multiplexed encoded audio and video data for transmittal to a terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove '904 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove '904 Products generate an MP4 or MKV container with the multiplexed encoded media.

188. Brightcove has directly infringed and continues to directly infringe the '904 Patent by, among other things, making, using, offering for sale, and/or selling technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Brightcove '904 Products.

189. The Brightcove '904 Products are available to businesses and individuals throughout the United States.

190. The Brightcove '904 Products are provided to businesses and individuals located in this District.

191. By making, using, testing, offering for sale, and/or selling products and services comprising technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Brightcove '904 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '904 Patent, including at least claim 11 pursuant to 35 U.S.C. § 271(a).

192. Brightcove has had knowledge of the '904 Patent and its infringement of the '904 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '904 Patent is well-known within the industry as demonstrated by multiple citations to the '904 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '904 Patent despite knowing of the '904 Patent and its infringement thereof. Brightcove is infringing the '904 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

193. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '904 Patent.

194. As a result of Brightcove's infringement of the '904 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 8,230,105

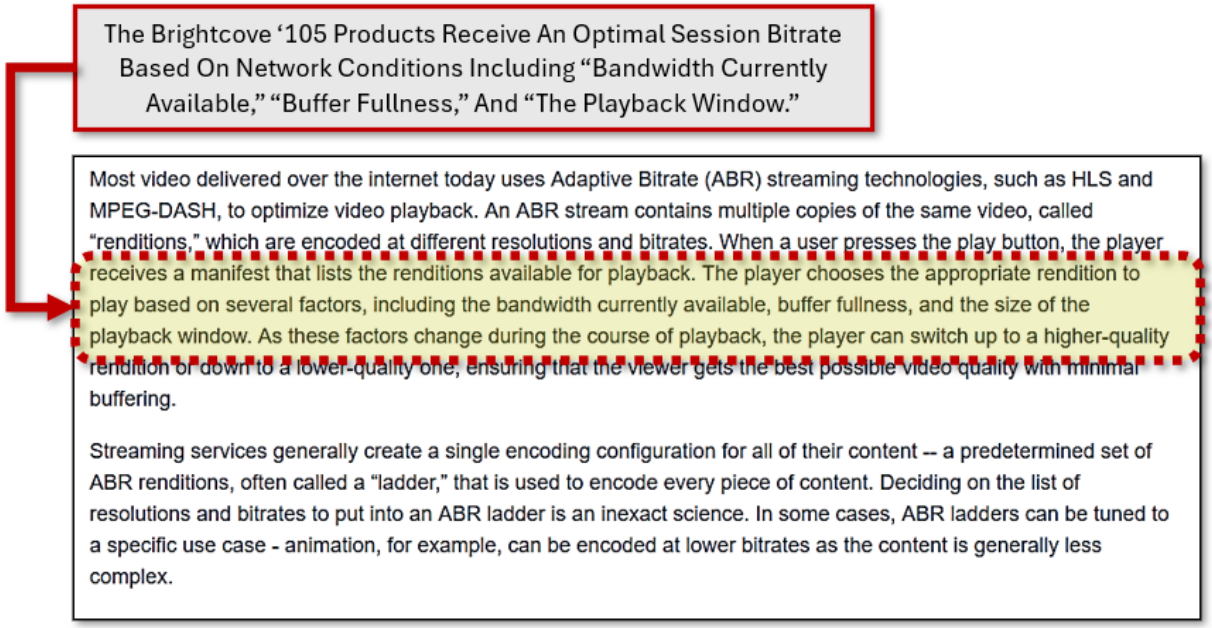
195. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

196. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising streaming technology that optimizes audio-video bitrate allocation.

197. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '105 Product(s)").

198. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '105 Products in regular business operations.

199. The Brightcove '105 Products receive an optimal session bitrate that is based on network conditions and device capabilities. Specifically, the Brightcove '105 products use Adaptive Bitrate (ABR) algorithms and feedback from client-side metrics—such as TCP acknowledgments, throughput measurements, and buffering status—to identify the optimal session bitrate. For example, the Brightcove '105 Products, through Context Aware Encoding and Dynamic Delivery functionality, determine an optimal session bitrate by utilizing estimated network conditions. For example, the Brightcove '105 Products receive an optimal session bitrate, as shown in Brightcove documentation which refers to "bandwidth currently available" and the "decoder_bitrate_cap" and "decoder_buffer_size" parameters.

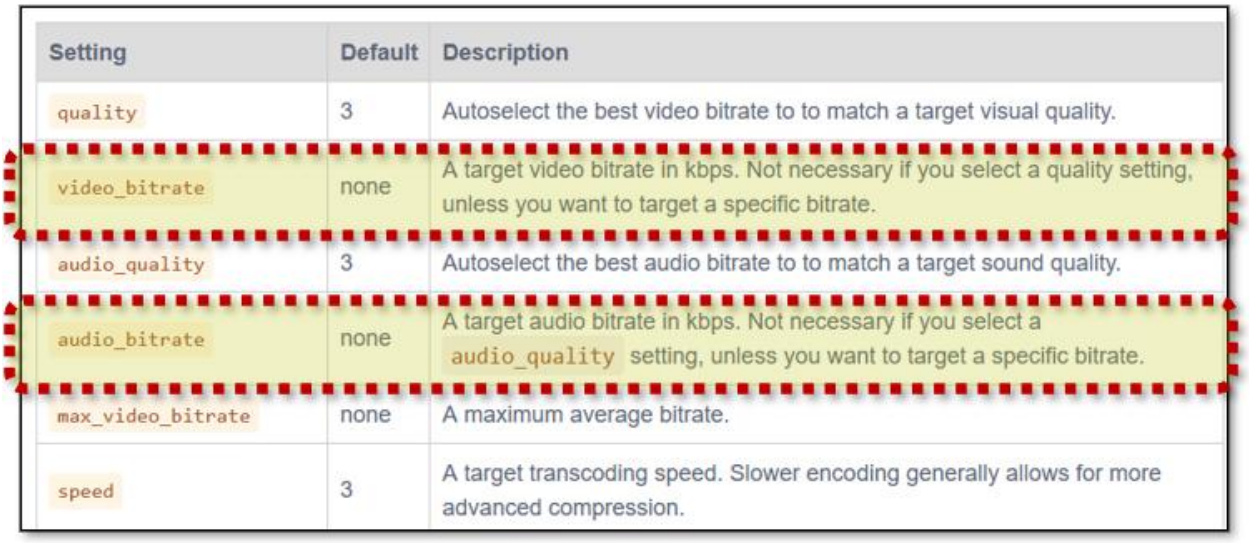


Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/general-information/overview-context-aware-encoding.html (last visited January 2025) (annotation added).

200. The Brightcove '105 Products receive the optimal session bitrate by considering both server-side and client-side information. In addition to the content analysis performed by Context Aware Encoding, which informs the initial bitrate ladder, the Brightcove '105 Products use "just-in-time" packaging. When a client device requests a video, the Brightcove '105 Products package the content into the appropriate format, including the necessary video and audio bitrates, based on the requirements of the requesting device and the available network bandwidth. For example, a request originating from a high-speed connection will prompt the system to package and deliver higher bitrate renditions, while a request from a low-speed connection will trigger the delivery of lower bitrate renditions.

201. The Brightcove '105 Products allocate the optimal session bitrate between audio and video media to produce an optimal audio bitrate and an optimal video bitrate based on a metric selected from a group including a predetermined allocation, a user preference, an optimal

performance data, privileging one type of data over the other, and an amount of audio and video media data to be provided. Specifically, the Brightcove '105 Products use Dynamic Delivery and Context Aware Encoding determine the best combination of audio and video renditions for a given piece of content and a client device's capabilities. For example, when creating ingest profiles, users can specify the desired audio and video bitrates (e.g., through the audio_bitrate and video_bitrate settings), effectively expressing a preference for how the available bandwidth should be divided between audio and video streams.

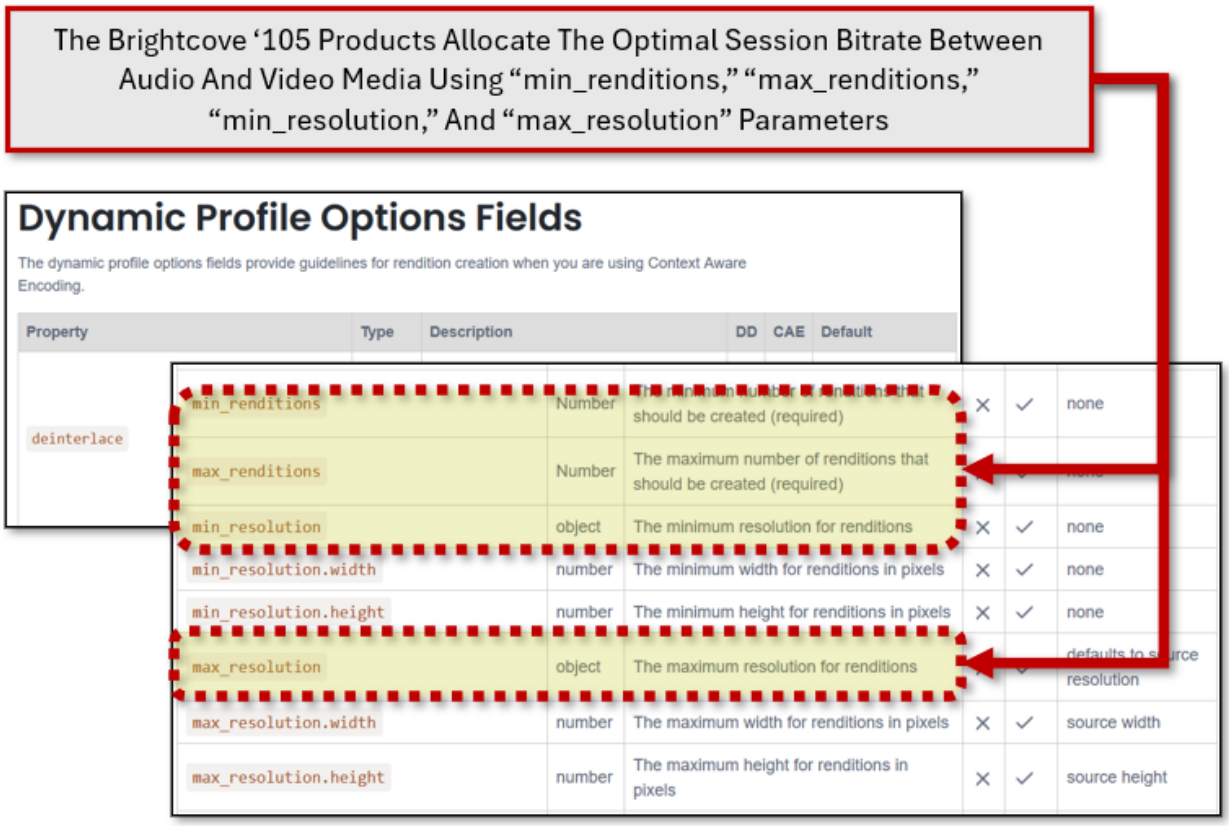


Setting	Default	Description
quality	3	Autoselect the best video bitrate to to match a target visual quality.
video_bitrate	none	A target video bitrate in kbps. Not necessary if you select a quality setting, unless you want to target a specific bitrate.
audio_quality	3	Autoselect the best audio bitrate to to match a target sound quality.
audio_bitrate	none	A target audio bitrate in kbps. Not necessary if you select a audio_quality setting, unless you want to target a specific bitrate.
max_video_bitrate	none	A maximum average bitrate.
speed	3	A target transcoding speed. Slower encoding generally allows for more advanced compression.

Encoding Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/quick-reference.html (last visited January 2025) (emphasis added).

202. The Brightcove '105 Products allocate the optimal session bitrate between audio and video media using parameters including "min_renditions," "max_renditions," "min_resolution," and "max_resolution" to manage media quality and bandwidth usage. Specifically, the Context Aware Encoding functionality in the Brightcove '105 Products analyzes source videos to build a custom bitrate ladder that accounts for the content's complexity, the device type, and the prevailing network conditions. For instance, the video_codec_options field within

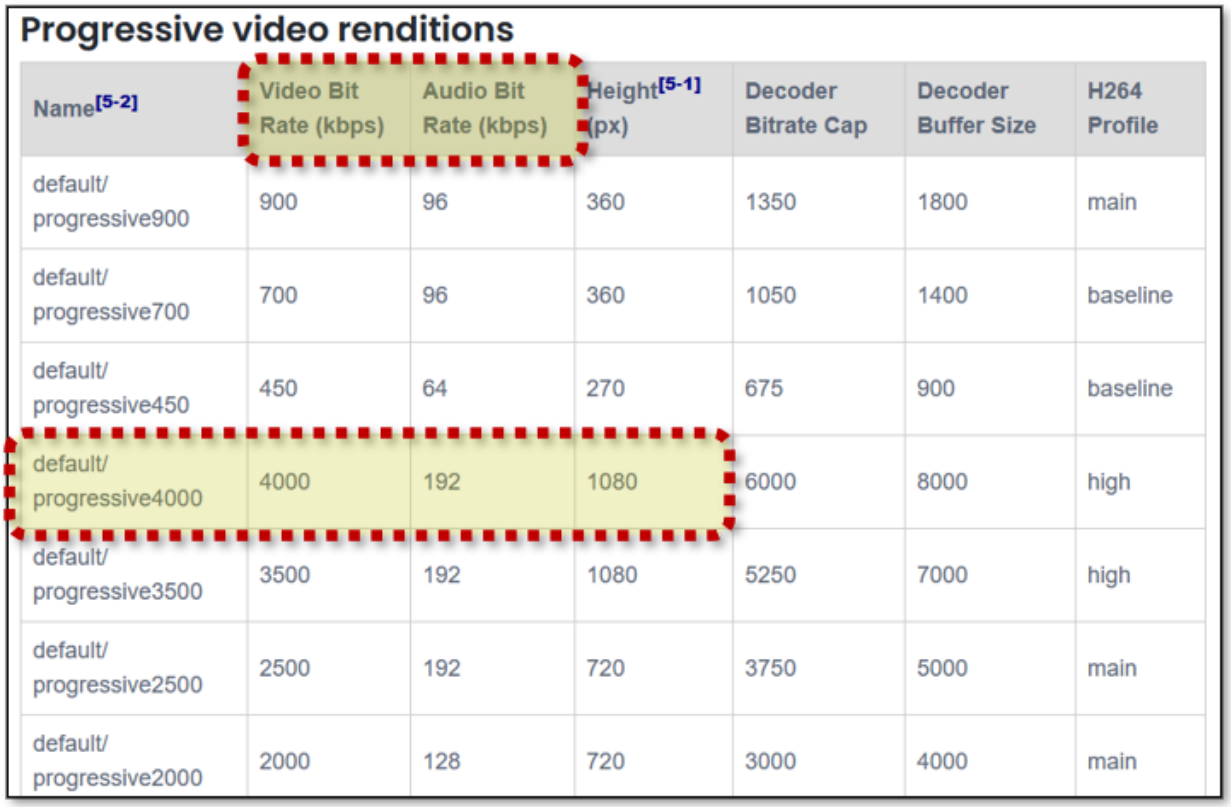
the dynamic_profile_options defines codec-specific constraints (e.g., min_bitrate and max_bitrate).



Ingest Profiles Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/ingest-profiles-api-fields-reference-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

203. The Brightcove '105 Products encode audio and video media data according to an optimal audio bitrate and an optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '105 Products encode audio and video media using a Dynamic Delivery ingest profiles wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '105

Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.



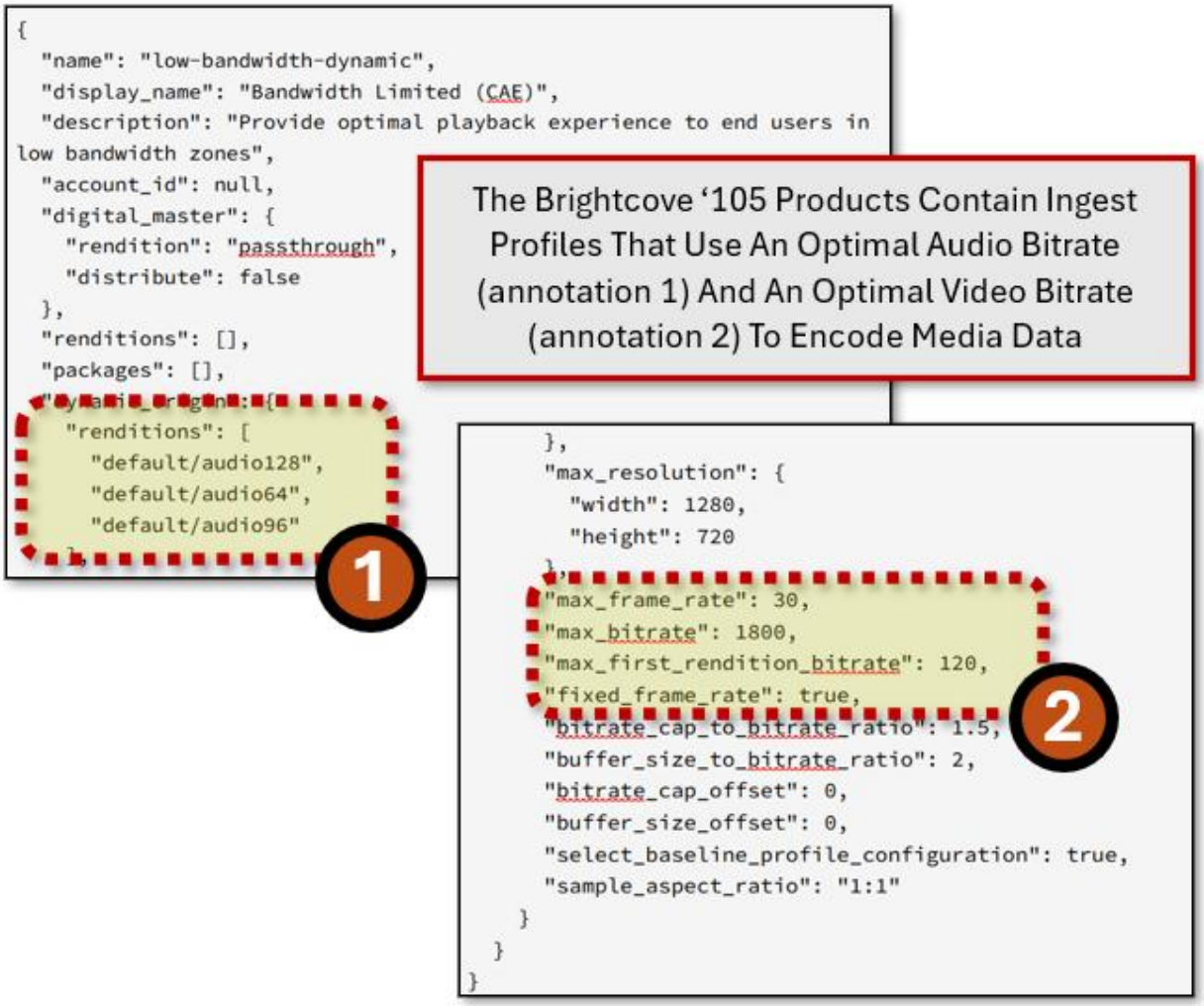
Progressive video renditions

Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

204. The Brightcove '105 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '105 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and "keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '105 Products set indicate minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both

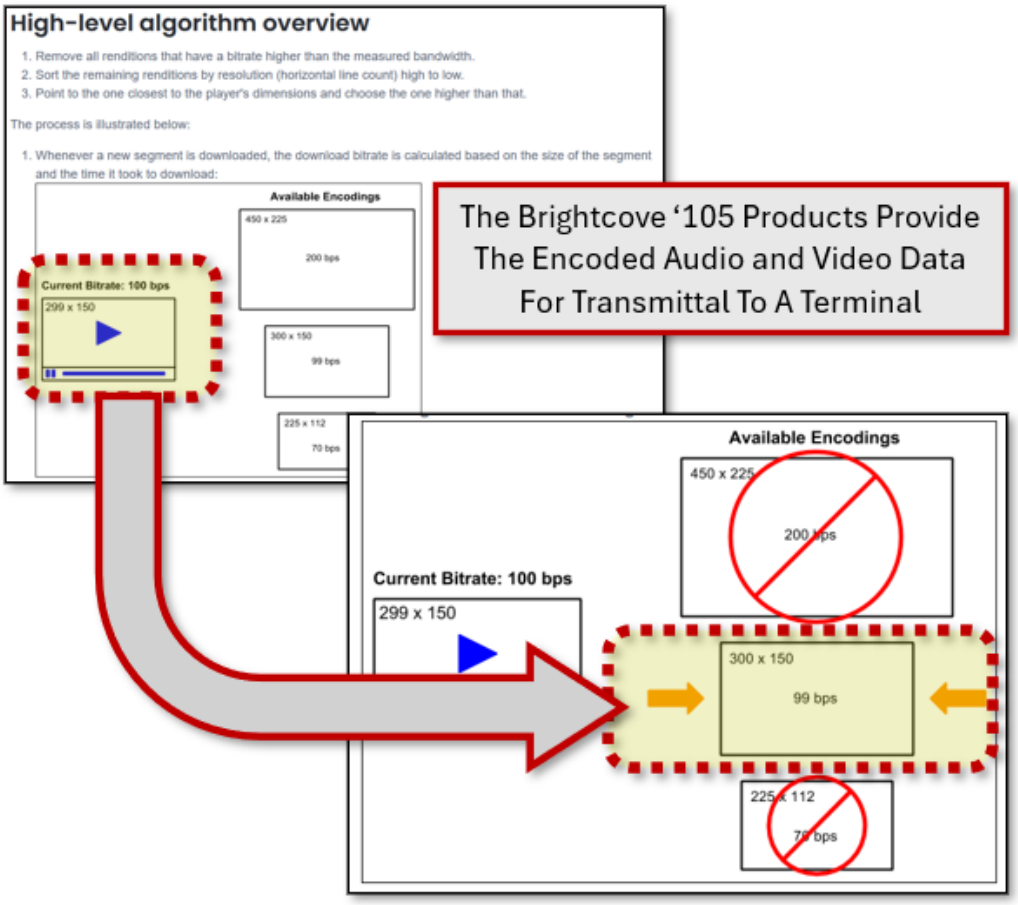
automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

205. The Brightcove '105 Products provide the encoded audio and video data for transmittal to a terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove '105 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove '105 Products generate manifests (such as HLS or DASH) that reference different video renditions, each encoded at

specific bitrates. As shown in the below excerpts from Brightcove documentation this audio and video data is then transmitted to a terminal.



Determining Which Rendition Will Play, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://player.support.brightcove.com/playback/determining-which-rendition-will-play.html (last visited January 2025) (annotation added).

206. The Brightcove '105 Products perform the continued delivery of the encoded audio and video data to a terminal. The Brightcove '105 Products maintain session stability by adhering to the optimal bitrate once it is selected, only adjusting upward or downward when updated bandwidth estimations or buffer thresholds indicate a necessary change. Hence, the Brightcove '105 Products transmit media content to the terminal at the optimal bitrates established by the ABR algorithms.

207. Brightcove has directly infringed and continues to directly infringe the ‘105 Patent by, among other things, making, using, offering for sale, and/or selling streaming technology that optimizes audio-video bitrate allocation, including but not limited to the Brightcove ‘105 Products.

208. The Brightcove ‘105 Products are available to businesses and individuals throughout the United States.

209. The Brightcove ‘105 Products are provided to businesses and individuals located in this District.

210. By making, using, testing, offering for sale, and/or selling products and services comprising streaming technology that optimizes audio-video bitrate allocation, including but not limited to the Brightcove ‘105 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘105 Patent, including at least claim 16 pursuant to 35 U.S.C. § 271(a).

211. Brightcove has had knowledge of the ‘105 Patent and its infringement of the ‘105 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the ‘105 Patent is well-known within the industry as demonstrated by multiple citations to the ‘105 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the ‘105 Patent despite knowing of the ‘105 Patent and its infringement thereof. Brightcove is infringing the ‘105 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

212. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘105 Patent.

213. As a result of Brightcove's infringement of the '105 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 8,255,551

214. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

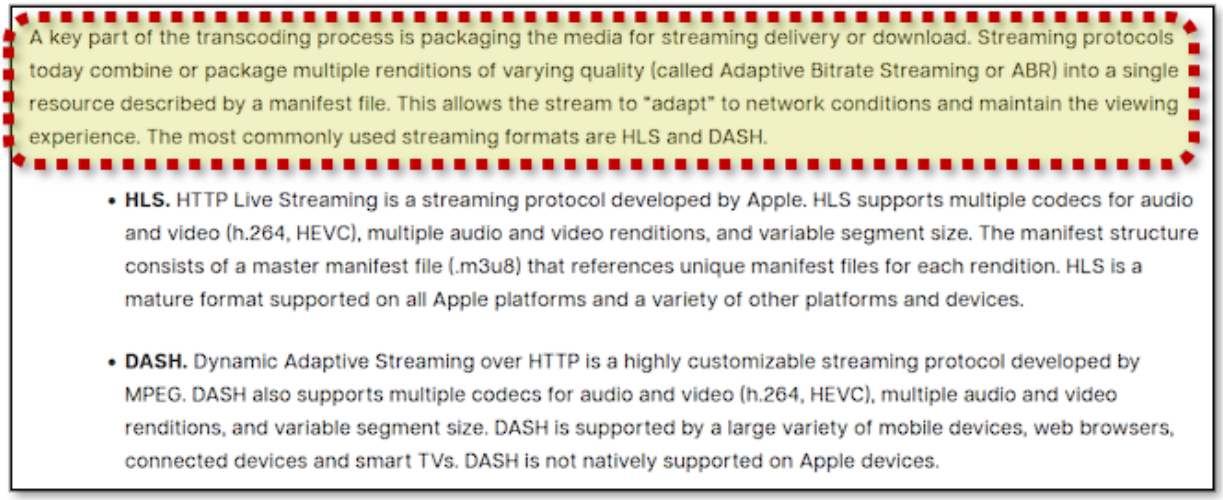
215. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising a technology for dynamically adapting audio and video bitrates based on TCP acknowledgments.

216. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Zencoder, Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '551 Product(s)").

217. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '551 Products in regular business operations.

218. The Brightcove '551 Products receive an optimal session bitrate based on information provided by a transport control protocol (TCP) acknowledgement. Specifically, the Brightcove '551 products use adaptive bitrate (ABR) functionality across HLS, MPEG-DASH, and RTMPS protocols, wherein each segment request is based on network feedback. For example, the platform initially delivers video segments according to a manifest file and subsequently adjusts the requested bitrate upon detecting TCP acknowledgements that signal successful or delayed

packet delivery. As shown in the below excerpt from Brightcove documentation this enables the Brightcove '551 Products to estimate network conditions and receive an optimal session bitrate based on these network conditions.



A key part of the transcoding process is packaging the media for streaming delivery or download. Streaming protocols today combine or package multiple renditions of varying quality (called Adaptive Bitrate Streaming or ABR) into a single resource described by a manifest file. This allows the stream to "adapt" to network conditions and maintain the viewing experience. The most commonly used streaming formats are HLS and DASH.

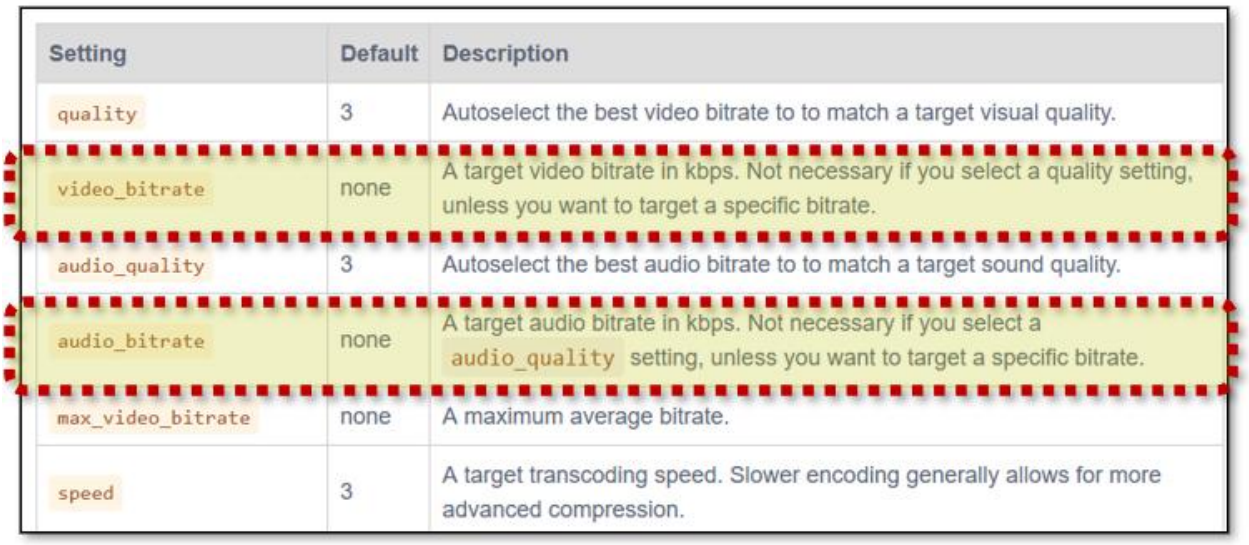
- **HLS.** HTTP Live Streaming is a streaming protocol developed by Apple. HLS supports multiple codecs for audio and video (h.264, HEVC), multiple audio and video renditions, and variable segment size. The manifest structure consists of a master manifest file (.m3u8) that references unique manifest files for each rendition. HLS is a mature format supported on all Apple platforms and a variety of other platforms and devices.

- **DASH.** Dynamic Adaptive Streaming over HTTP is a highly customizable streaming protocol developed by MPEG. DASH also supports multiple codecs for audio and video (h.264, HEVC), multiple audio and video renditions, and variable segment size. DASH is supported by a large variety of mobile devices, web browsers, connected devices and smart TVs. DASH is not natively supported on Apple devices.

Video Transcoding: The Basics and Advanced Solutions, BRIGHTCOVE WEBSITE, *available at*: https://www.brightcove.com/fr/resources/blog/video-transcoding-dynamic-ingest-and-apis-overview/ (last visited January 2025) (emphasis added).

219. The Brightcove '551 Products receive throughput and congestion information from TCP acknowledgement packets, which enable the receipt and identification of an optimal bitrate. In addition, the Brightcove '551 Products receive and process network metrics (*e.g.*, packet delivery times, packet loss indicators, etc.) to determine a terminal's available bandwidth. Where the received metrics show reduced bandwidth or elevated latency, the Brightcove '551 Products request a lower-bitrate segment. Further, the Brightcove '551 Products use a feedback loop system wherein TCP acknowledgment data from the client device informs the selection of the optimal session bitrate from renditions encoded at varying bitrates. The Brightcove '551 Products analyze TCP acknowledgments to evaluate network throughput and stability and determine which bitrate variant is optimal. For instance, when TCP acknowledgments indicate network congestion through increased packet loss, the Brightcove '551 Products adjusts to a lower bitrate stream.

220. The Brightcove '551 Products allocate the optimal session bitrate between audio and video media to produce an optimal audio bitrate and an optimal video bitrate, wherein allocating the optimal session bitrate between audio and video media involves allocating a higher bitrate for either the audio media or the video media over the other. Specifically, the Brightcove '551 Products use Dynamic Delivery and Context Aware Encoding to determine the most suitable combination of audio and video renditions for the given content and the client device's capabilities. For example, when creating ingest profiles, users can specify distinct audio and video bitrates (*e.g.*, through the audio_bitrate and video_bitrate settings), effectively directing the Brightcove '551 Products to prioritize one stream over the other based on the selected parameters.

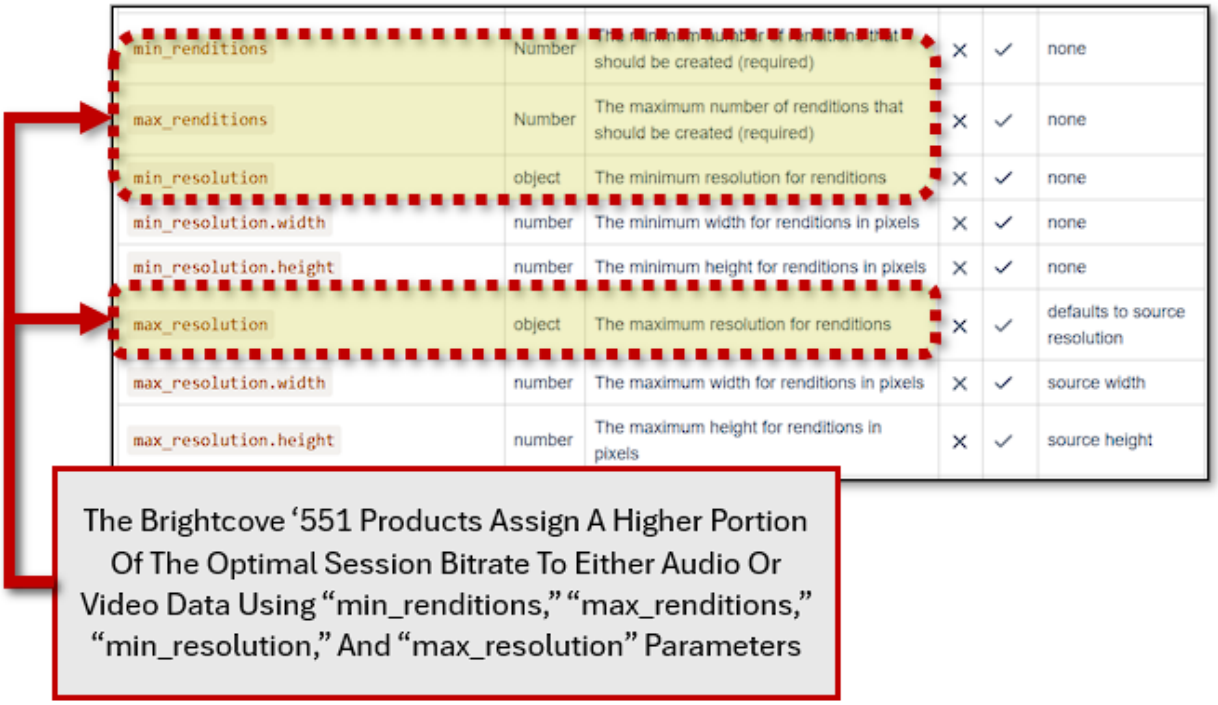


Setting	Default	Description
quality	3	Autoselect the best video bitrate to to match a target visual quality.
video_bitrate	none	A target video bitrate in kbps. Not necessary if you select a quality setting, unless you want to target a specific bitrate.
audio_quality	3	Autoselect the best audio bitrate to to match a target sound quality.
audio_bitrate	none	A target audio bitrate in kbps. Not necessary if you select a audio_quality setting, unless you want to target a specific bitrate.
max_video_bitrate	none	A maximum average bitrate.
speed	3	A target transcoding speed. Slower encoding generally allows for more advanced compression.

Encoding Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/quick-reference.html (last visited January 2025) (emphasis added).

221. The Brightcove '551 Products further allocate the optimal session bitrate using parameters such as "min_renditions," "max_renditions," "min_resolution," and "max_resolution," thus enabling the platform to assign a higher portion of the available bandwidth to either audio or video. Specifically, the Context Aware Encoding functionality constructs a bitrate ladder that

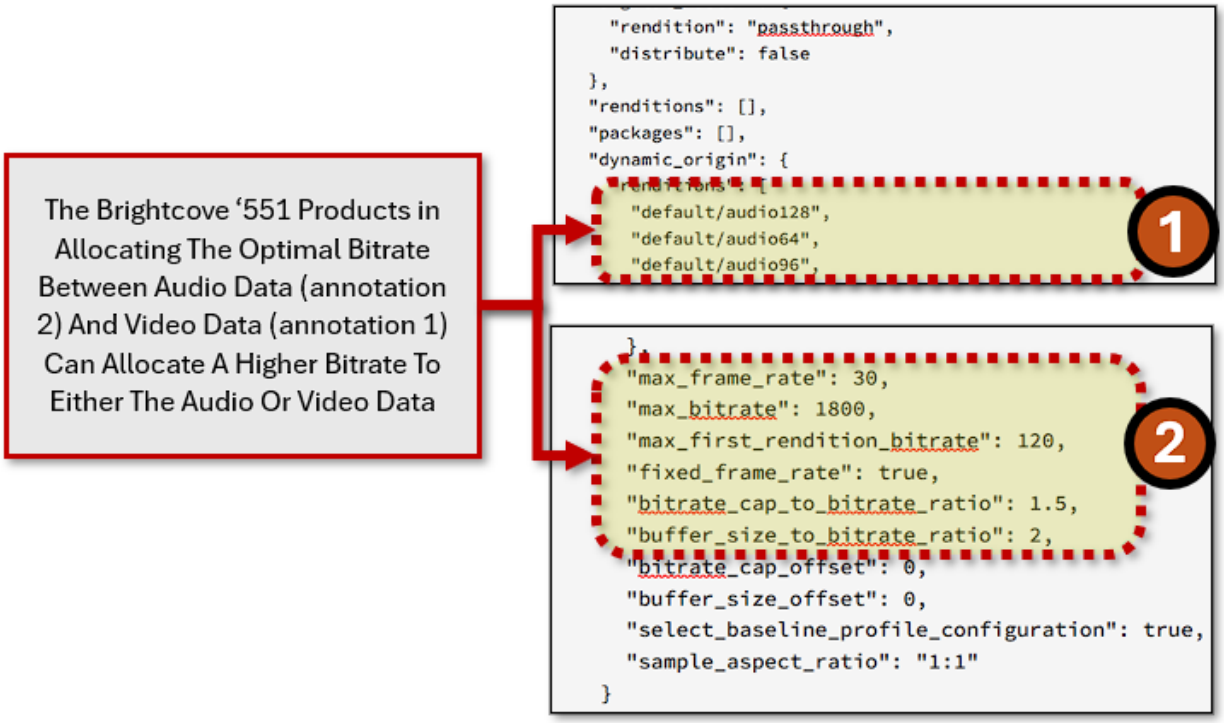
accounts for the complexity of the source content, the device type, and the prevailing network conditions. For instance, the video_codec_options field within the dynamic_profile_options defines codec-specific constraints (*e.g.*, min_bitrate and max_bitrate), allowing the system to dynamically favor either audio or video under certain bandwidth scenarios.



Ingest Profiles Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/ingest-profiles-api-fields-reference-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

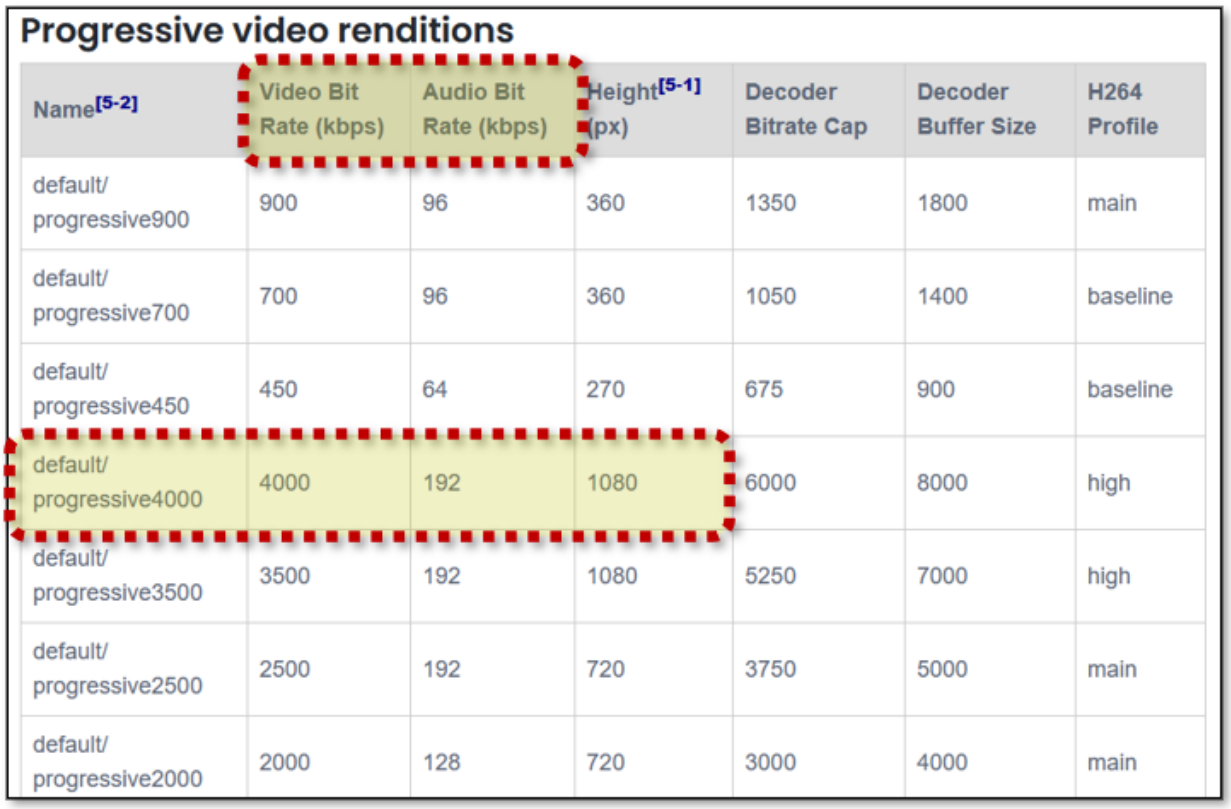
222. The Brightcove '551 Products facilitate allocating a higher bitrate to either the video or audio media by generating separate audio-only renditions alongside video renditions. Specifically, Context Aware Encoding produces audio-only renditions at 64, 96, 128, or 192 kbps while simultaneously creating video renditions at complementary bitrates. For example, the ingest profiles field "audio_bitrate" sets the target bitrate for the audio data and can exceed the maximum video bitrate. Specifically, the "low-bandwidth-dynamic-with-mp4" ingest profile demonstrates

this prioritization by the Brightcove '551 Products by allocating the audio bitrate at either 64, 96, or 128 kbps while capping the maximum first rendition bitrate for video at 120 kbps.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

223. The Brightcove '551 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '551 Products encode audio and video media using a Dynamic Delivery ingest profiles wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '551 Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.



Progressive video renditions

Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

224. The Brightcove '551 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '551 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and "keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '551 Products set indicate minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.

225. The Brightcove ‘551 Products multiplex the encoded audio and video media data. Specifically, the Dynamic Delivery system within the Brightcove ‘551 Products utilizes a just-in-time packaging approach, where encoded audio and video renditions are combined into a bitstream. For example, when a request is made for a video, the Brightcove ‘551 Products identify the appropriate audio and video renditions based on the selected ingest profile and package them into a single container such as MP4 or MKV.

226. The Brightcove ‘551 Products multiplex the encoded audio and video data by combining the audio and video tracks into a single container as part of its distribution process. Specifically, Brightcove ‘551 Products encode audio and video streams separately and then applies a containerization mechanism, such as MPEG-4 or fragmented MP4 (fMP4), that merges the audio and video bitstreams. For example, Brightcove’s workflow includes using internal packaging functions that attach the encoded audio track alongside the encoded video track within the same file structure.

227. The Brightcove ‘551 Products provide the multiplexed audio and video data for transmittal to a terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove ‘551 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove ‘551 Products generate an MP4 or MKV container with the multiplexed encoded media.

228. Brightcove has directly infringed and continues to directly infringe the ‘551 Patent by, among other things, making, using, offering for sale, and/or selling technology for dynamically adapting audio and video bitrates based on TCP acknowledgments, including but not limited to the Brightcove ‘551 Products.

229. The Brightcove '551 Products are available to businesses and individuals throughout the United States.

230. The Brightcove '551 Products are provided to businesses and individuals located in this District.

231. By making, using, testing, offering for sale, and/or selling products and services comprising technology for dynamically adapting audio and video bitrates based on TCP acknowledgments, including but not limited to the Brightcove '551 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '551 Patent, including at least claim 12 pursuant to 35 U.S.C. § 271(a).

232. Brightcove has had knowledge of the '551 Patent and its infringement of the '551 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '551 Patent is well-known within the industry as demonstrated by multiple citations to the '551 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '551 Patent despite knowing of the '551 Patent and its infringement thereof. Brightcove is infringing the '551 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

233. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '551 Patent.

234. As a result of Brightcove's infringement of the '551 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 8,769,141

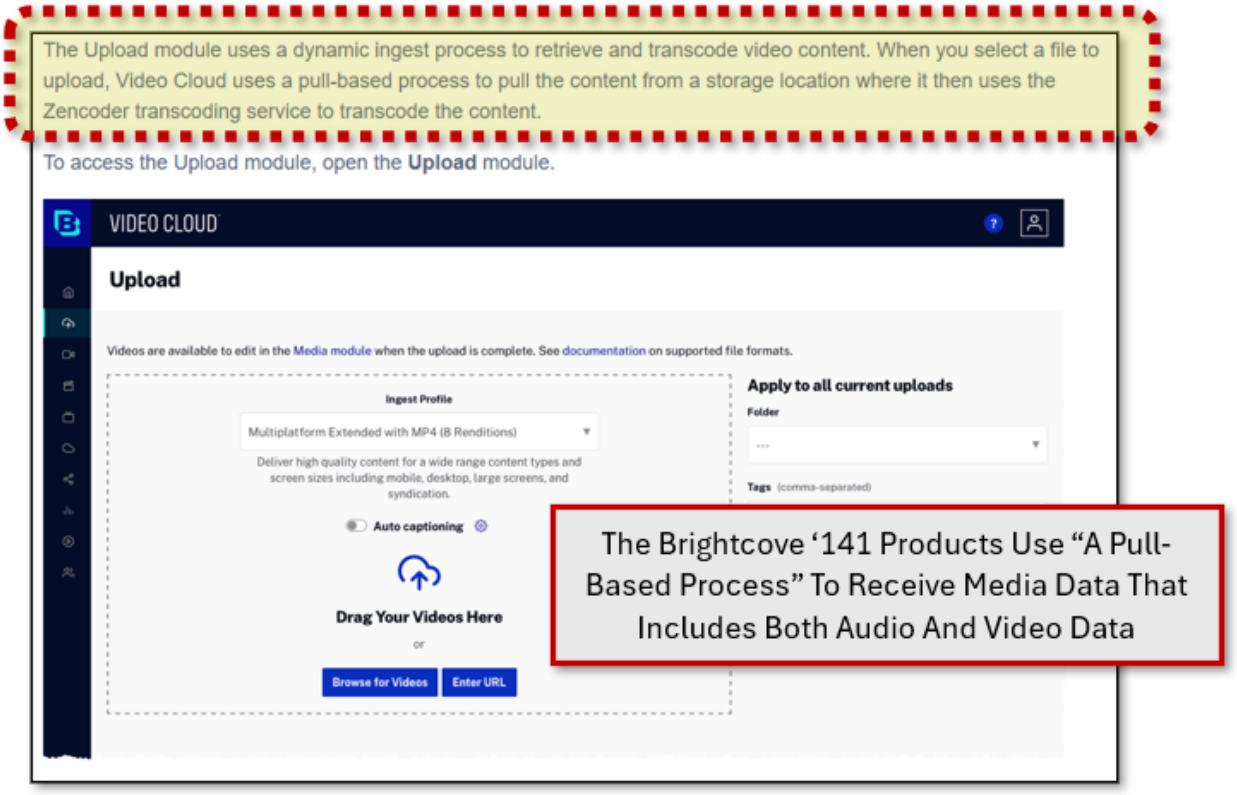
235. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

236. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for encoding media data using optimal audio and video bitrates and multiplexing the data for transmission.

237. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Zencoder, Brightcove Video Cloud including Brightcove Dynamic Delivery and Brightcove Live Stream functionality, and Brightcove's Context Aware Encoding, which is integrated into Video Cloud as well as other Brightcove products (collectively, the "Brightcove '141 Product(s)").

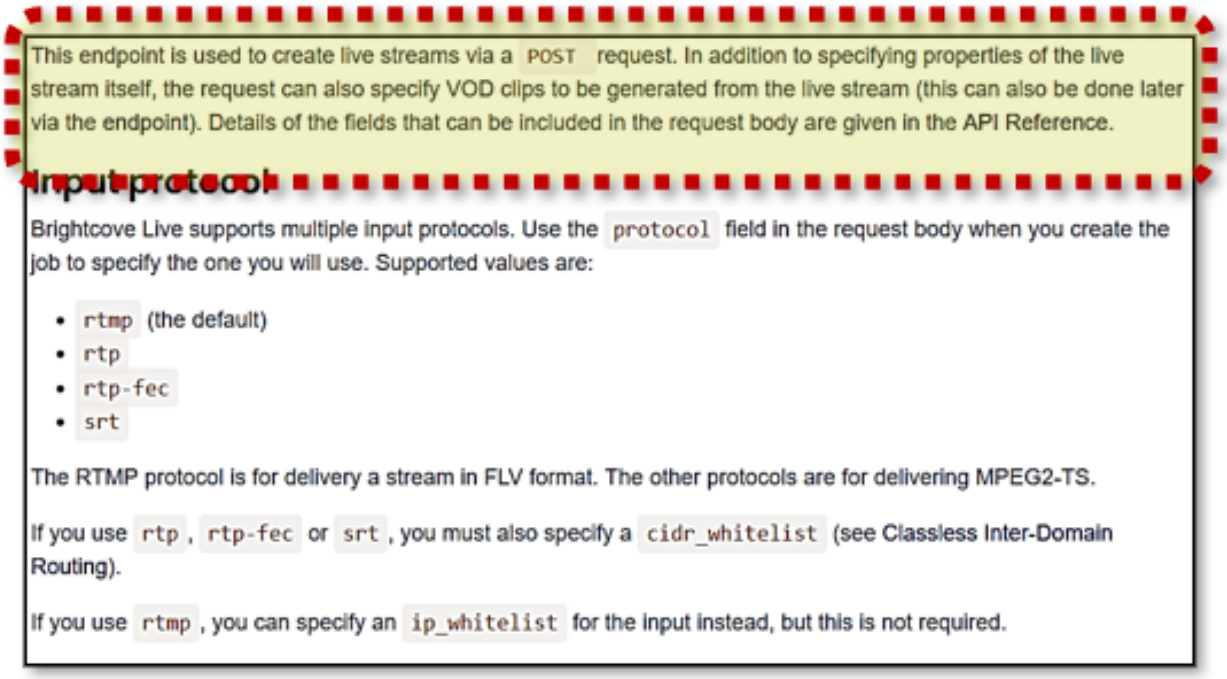
238. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '141 Products in regular business operations.

239. The Brightcove '141 Products receive media data, including both audio and video data, through several ingestion methods, such as the Upload module and the Dynamic Ingest API. Specifically, the Brightcove '141 Upload module ingests files that include both audio and video data from their local machines or cloud storage. In addition, the Brightcove '141 Products use the Dynamic Ingest API to receive media data in a variety of input formats and protocols, including standard HTTP/HTTPS, S3, and FTP.



Uploading Videos Using the Upload Module, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://studio.support.brightcove.com/media/manage/uploading-videos-using-upload-module.html (last visited January 2025) (emphasis added).

240. The Brightcove '141 Products receive media data using Brightcove's Dynamic Ingest API which accepts a master object with a url field that specifies the location of the source video file (containing both video and audio). Specifically, the Dynamic Ingest API performs the receiving of a variety of audio formats, including AAC, MP3, and Dolby audio codecs. In addition, the Brightcove '141 Products receive media data using Brightcove's Live module which receives media data, including both audio and video, by accepting live streams from encoders. Specifically, the Live module supports input formats such as RTMP, RTP, SRT, and Zixi, allowing for the ingestion of live video and audio streams. Further, the Brightcove '141 Products receive media data from video encoders at a Streaming Endpoint (RTMP URL).



This endpoint is used to create live streams via a `POST` request. In addition to specifying properties of the live stream itself, the request can also specify VOD clips to be generated from the live stream (this can also be done later via the endpoint). Details of the fields that can be included in the request body are given in the API Reference.

Input protocol

Brightcove Live supports multiple input protocols. Use the `protocol` field in the request body when you create the job to specify the one you will use. Supported values are:

- `rtmp` (the default)
- `rtp`
- `rtp-fec`
- `srt`

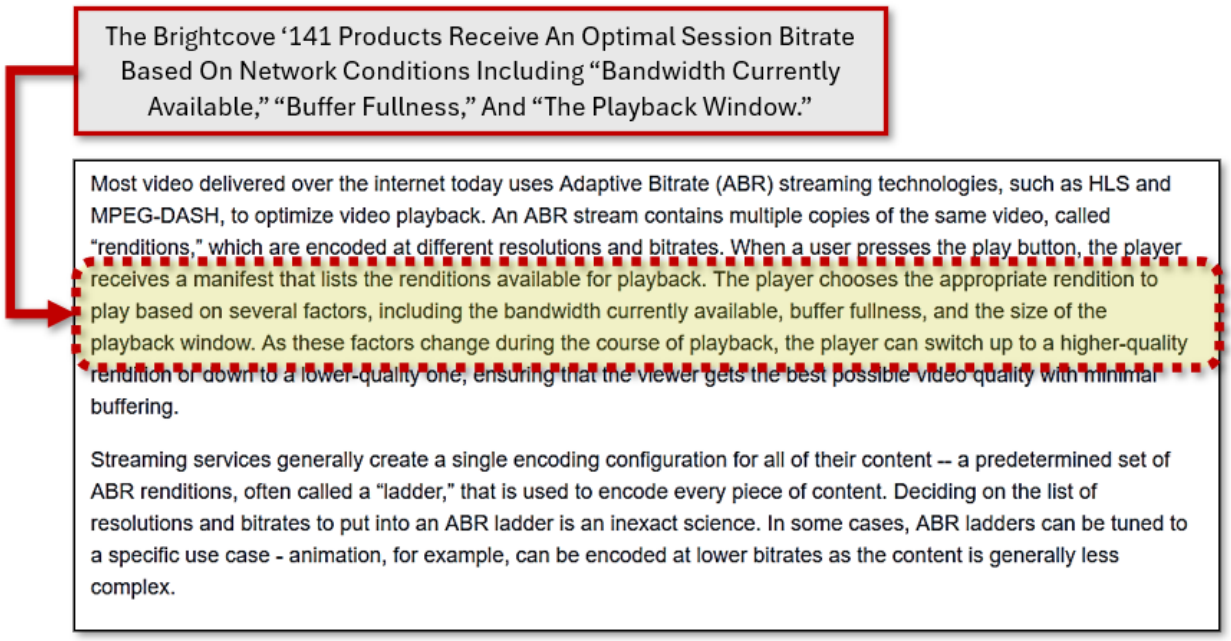
The RTMP protocol is for delivery a stream in FLV format. The other protocols are for delivering MPEG2-TS.

If you use `rtp`, `rtp-fec` or `srt`, you must also specify a `cidr_whitelist` (see Classless Inter-Domain Routing).

If you use `rtmp`, you can specify an `ip_whitelist` for the input instead, but this is not required.

Overview: Brightcove Live API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/live-api/getting-started/overview-brightcove-live-api.html (last visited January 2025) (emphasis added).

241. The Brightcove ‘141 Products receive an optimal session bitrate. Specifically, the Brightcove ‘141 products use Adaptive Bitrate (ABR) algorithms and feedback from client-side metrics—such as TCP acknowledgments, throughput measurements, and buffering status—to identify the optimal session bitrate. For example, the Brightcove ‘141 Products, through Context Aware Encoding and Dynamic Delivery functionality, determine an optimal session bitrate by utilizing estimated network conditions. For example, the Brightcove ‘141 Products receive an optimal session bitrate, as shown in Brightcove documentation which refers to “bandwidth currently available” and the “decoder_bitrate_cap” and “decoder_buffer_size” parameters.

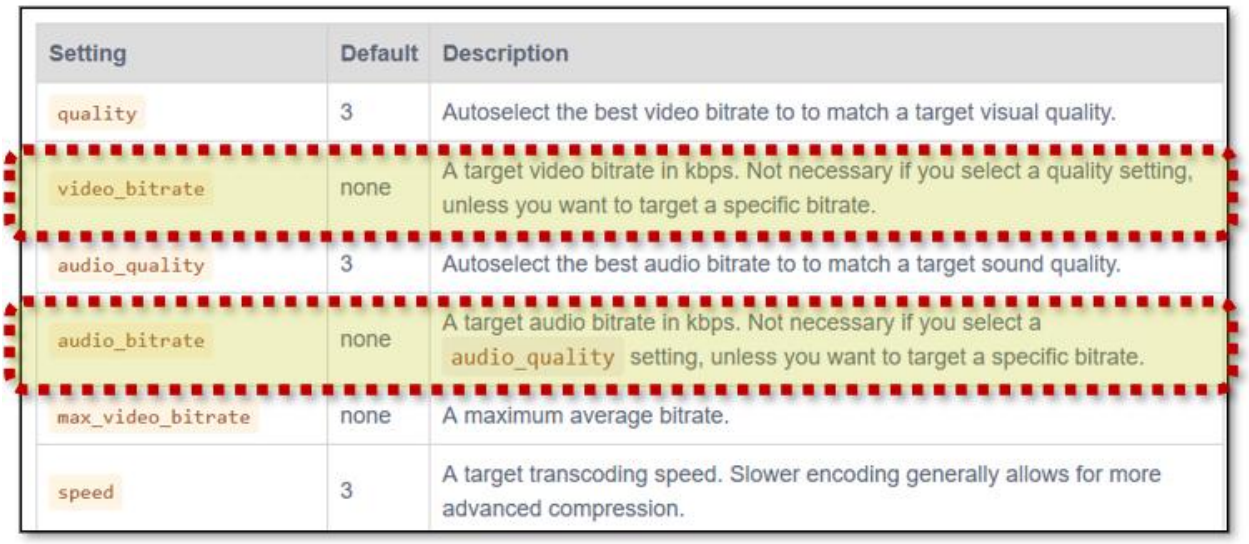


Overview of Context Aware Encoding, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/general-information/overview-context-aware-encoding.html (last visited January 2025) (annotation added).

242. The Brightcove '141 Products receive the optimal session bitrate by considering both server-side and client-side information. In addition to the content analysis performed by Context Aware Encoding, which informs the initial bitrate ladder, the Brightcove '141 Products use "just-in-time" packaging. When a client device requests a video, the Brightcove '141 Products package the content into the appropriate format, including the necessary video and audio bitrates, based on the requirements of the requesting device and the available network bandwidth. For example, a request originating from a high-speed connection will prompt the system to package and deliver higher bitrate renditions, while a request from a low-speed connection will trigger the delivery of lower bitrate renditions.

243. The Brightcove '141 Products allocate the optimal session bitrate between audio and video media to produce an optimal audio bitrate and an optimal video bitrate, wherein allocating the optimal session bitrate between audio and video media can involves allocating a higher bitrate for either the audio media or the video media over the other. Specifically, the

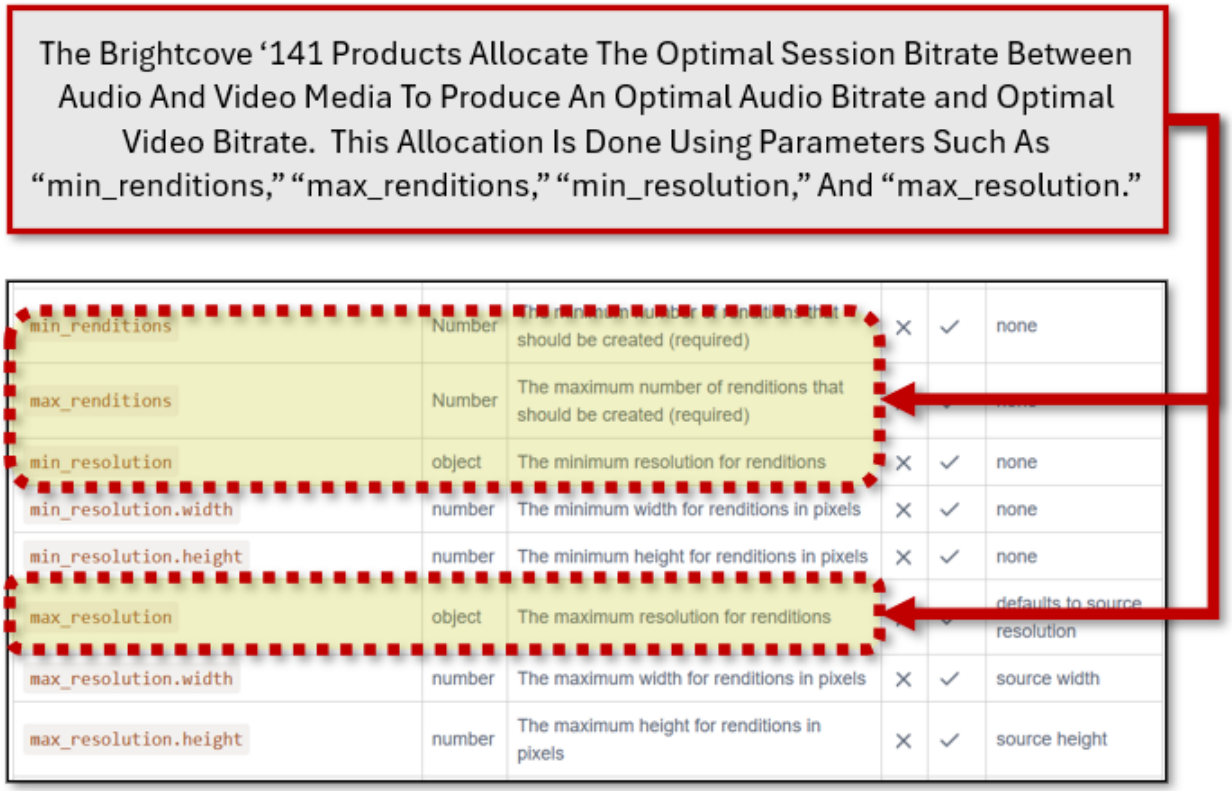
Brightcove '141 Products use Dynamic Delivery and Context Aware Encoding to determine the best combination of audio and video renditions for a given piece of content and a client device's capabilities. For example, when creating ingest profiles, users can specify the desired audio and video bitrates (e.g., through the audio_bitrate and video_bitrate settings), effectively expressing a preference for how the available bandwidth should be divided between audio and video streams.



Setting	Default	Description
`quality`	3	Autoselect the best video bitrate to to match a target visual quality.
`video_bitrate`	none	A target video bitrate in kbps. Not necessary if you select a quality setting, unless you want to target a specific bitrate.
`audio_quality`	3	Autoselect the best audio bitrate to to match a target sound quality.
`audio_bitrate`	none	A target audio bitrate in kbps. Not necessary if you select a `audio_quality` setting, unless you want to target a specific bitrate.
`max_video_bitrate`	none	A maximum average bitrate.
`speed`	3	A target transcoding speed. Slower encoding generally allows for more advanced compression.

Encoding Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/quick-reference.html (last visited January 2025) (emphasis added).

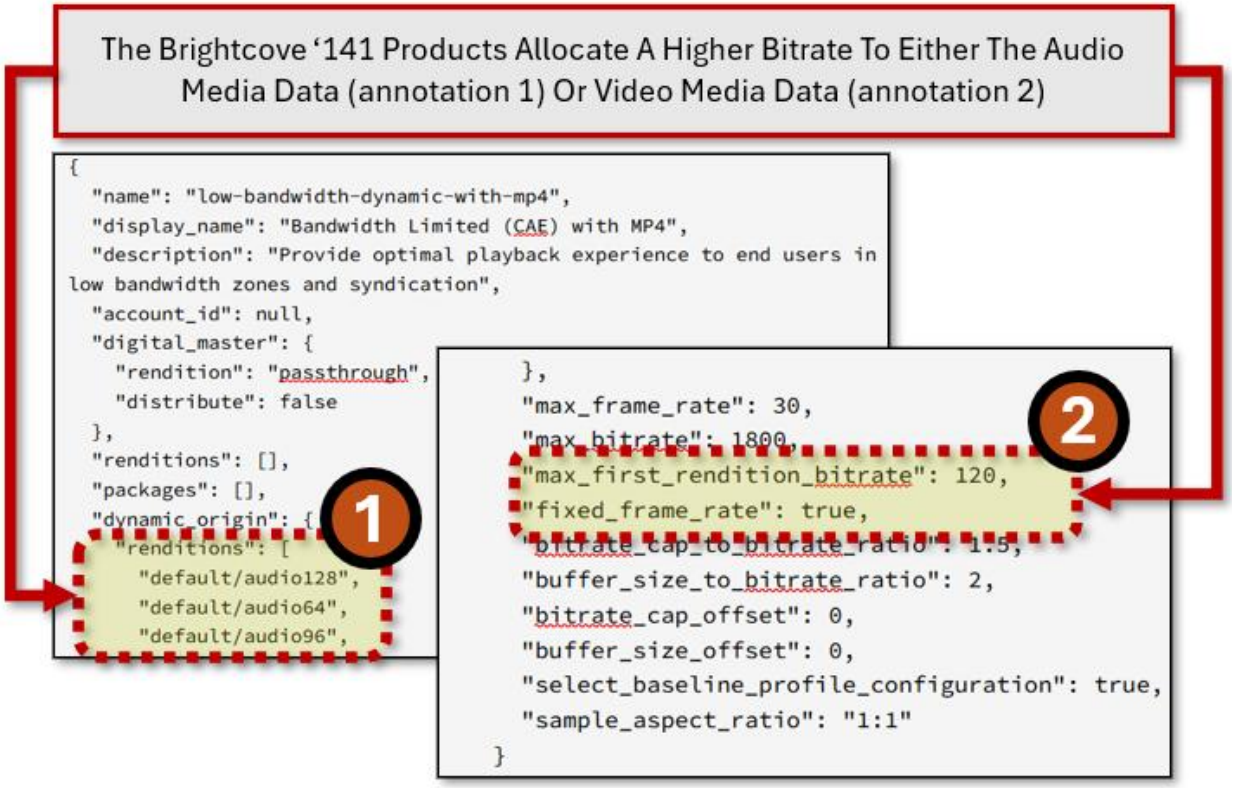
244. The Brightcove '141 Products allocate the optimal session bitrate between audio and video media using parameters including "min_renditions," "max_renditions," "min_resolution," and "max_resolution" to manage media quality and bandwidth usage. Specifically, the Context Aware Encoding functionality in the Brightcove '141 Products analyzes source videos to build a custom bitrate ladder that accounts for the content's complexity, the device type, and the prevailing network conditions. For instance, the video_codec_options field within the dynamic_profile_options defines codec-specific constraints (e.g., min_bitrate and max_bitrate).



Ingest Profiles Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/ingest-profiles-api-fields-reference-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

245. The Brightcove '141 Products allocate a higher bitrate to either the audio or the video media by generating separate audio-only renditions, alongside video renditions, demonstrating the Brightcove '141 Products can allocate specific bitrates for each media type independently. Further, the Context Aware Encoding functionality of the Brightcove '141 Products generates audio-only renditions with bitrates of 64, 96, 128, or 192 kbps, in addition to multiple video renditions of varying bitrates and resolutions. The ingest profiles field "audio_bitrate" in the Brightcove '141 Products sets the target bitrate for the audio data and can be set above or below the bitrate of the video data. For example, the "low-bandwidth-dynamic-with-mp4" ingestion profile allocates the audio bitrate at either 128 Kbps, 64 Kbps, or 96 Kbps

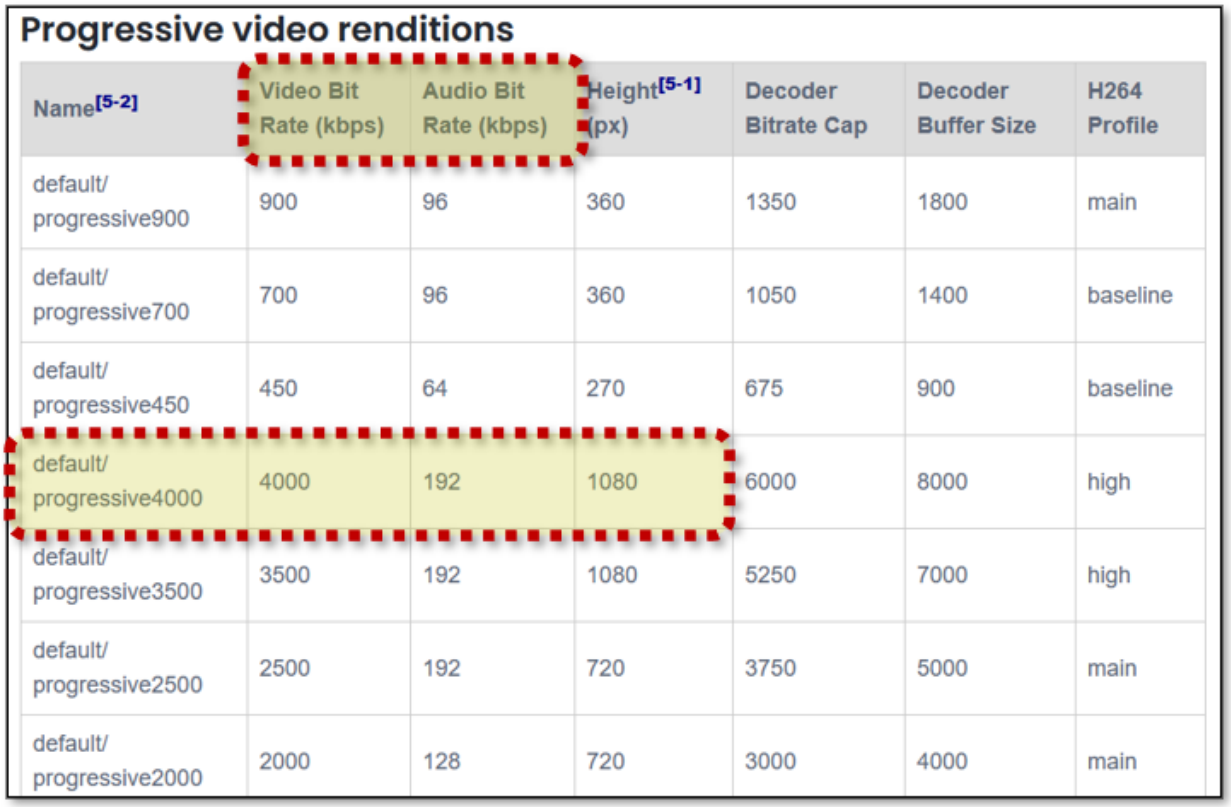
and sets the maximum first rendition bitrate for video at 120 Kbps. The below excerpt from Brightcove documentation shows the Brightcove '141 Products allocate a higher bitrate for either the audio media or the video media, depending on the selection.



Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

246. The Brightcove '141 Products encode audio and video media data according to an optimal audio bitrate and an optimal video bitrate. Specifically, Brightcove's Dynamic Delivery and Context Aware Encoding functionality use ingest profiles to define encoding settings, including target bitrates for both audio and video renditions. For example, the Brightcove '141 Products encode audio and video media using a Dynamic Delivery ingest profiles wherein Brightcove will set a target audio and target video bitrate such as "video_bitrate": 4000 for a 1080p rendition, and "audio_bitrate": 192 for a 192-kbps audio rendition. Further, the Brightcove '141

Products analyze the source media to determine an optimal set of renditions, including their respective audio and video bitrates, based on content complexity and delivery constraints.



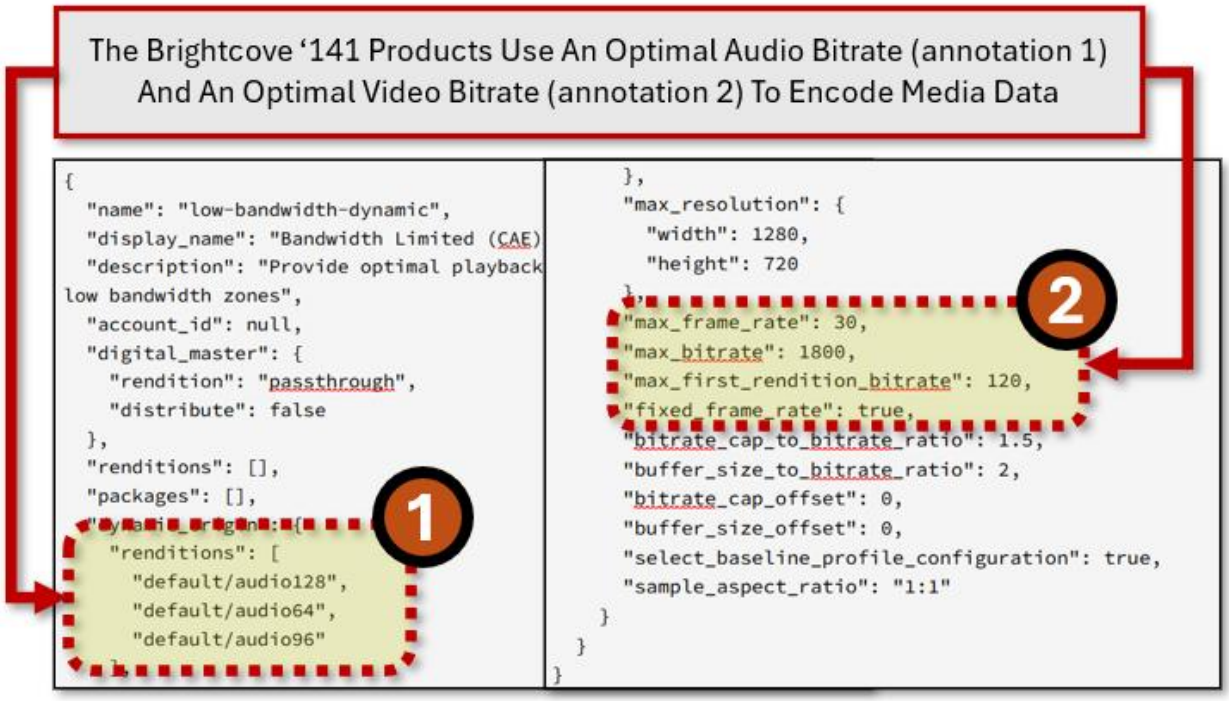
Progressive video renditions

Name[5-2]	Video Bit Rate (kbps)	Audio Bit Rate (kbps)	Height[5-1] (px)	Decoder Bitrate Cap	Decoder Buffer Size	H264 Profile
default/ progressive900	900	96	360	1350	1800	main
default/ progressive700	700	96	360	1050	1400	baseline
default/ progressive450	450	64	270	675	900	baseline
default/ progressive4000	4000	192	1080	6000	8000	high
default/ progressive3500	3500	192	1080	5250	7000	high
default/ progressive2500	2500	192	720	3750	5000	main
default/ progressive2000	2000	128	720	3000	4000	main

Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (emphasis added).

247. The Brightcove '141 Products allocate the optimal session bitrate between audio and video media and encode the audio and video media using the allocated audio and video bitrates. Specifically, the Brightcove '141 Products encode audio and video media data using granular parameters within ingest profiles using specific audio and video bitrates. These ingest profiles may include fields such as "video_bitrate," "audio_bitrate," "h264_profile," and "keyframe_interval" to fine-tune audio and video encoding using specific audio and video bitrates. Further, the Brightcove '141 Products set indicate minimum and maximum target bitrates, as well as resolution bounds, through parameters like "max_bitrate" and "max_resolution." Hence, both

automated ingestion profiles and granular parameters function to encode audio and video data using the optimal audio and media bitrates.

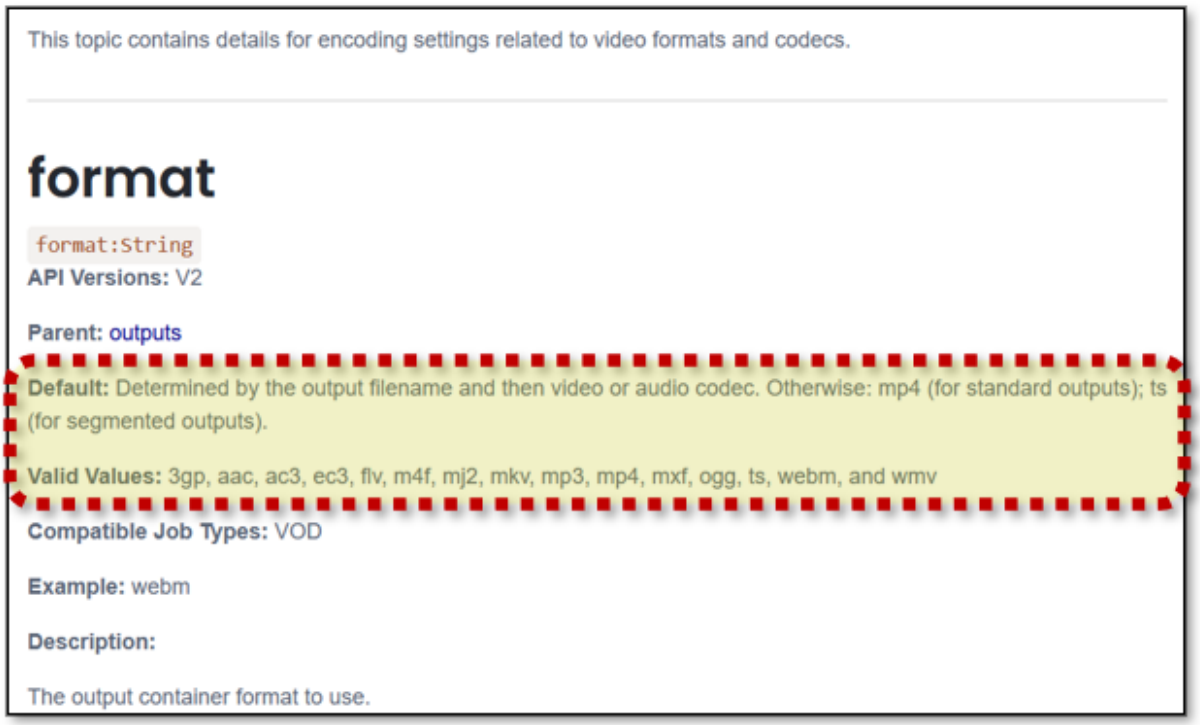


Standard Ingest Profiles, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/references/standard-ingest-profiles-dynamic-delivery-and-context-aware-encoding.html (last visited January 2025) (annotation added).

248. The Brightcove '141 Products multiplex the encoded audio and video media data. Specifically, the Dynamic Delivery system within the Brightcove '141 Products utilizes a just-in-time packaging approach, where encoded audio and video renditions are combined into a bitstream. For example, when a request is made for a video, the Brightcove '141 Products identify the appropriate audio and video renditions based on the selected ingest profile and package them into a single container such as MP4 or MKV.

249. The Brightcove '141 Products multiplex the encoded audio and video data by combining the audio and video tracks into a single container as part of its distribution process. Specifically, Brightcove '141 Products encode audio and video streams separately and then apply

a containerization mechanism, such as MPEG-4 or fragmented MP4 (fMP4), that merges the audio and video bitstreams. For example, Brightcove's workflow includes using internal packaging functions that attach the encoded audio track alongside the encoded video track within the same file structure.



Format/Codecs Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/formats-codecs/encoding-settings-format-and-codecs.html (last visited January 2025) (emphasis added).

250. The Brightcove '141 Products provide the multiplexed encoded audio and video data for transmittal to a terminal. Specifically, once the video and audio data are encoded using the optimal audio and video bitrate, the Brightcove '141 Products deliver the encoded audio and video data to a terminal. For instance, when utilizing Dynamic Delivery, the Brightcove '141 Products generate a MP4 or MKV container with the multiplexed encoded media.

251. Brightcove has directly infringed and continues to directly infringe the '141 Patent by, among other things, making, using, offering for sale, and/or selling technology for encoding

media data using optimal audio and video bitrates and multiplexing the data for transmission, including but not limited to the Brightcove '141 Products.

252. The Brightcove '141 Products are available to businesses and individuals throughout the United States.

253. The Brightcove '141 Products are provided to businesses and individuals located in this District.

254. By making, using, testing, offering for sale, and/or selling products and services comprising technology for encoding media data using optimal audio and video bitrates and multiplexing the data for transmission, including but not limited to the Brightcove '141 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '141 Patent, including at least claim 20 pursuant to 35 U.S.C. § 271(a).

255. Brightcove has had knowledge of the '141 Patent and its infringement of the '141 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '141 Patent is well-known within the industry as demonstrated by multiple citations to the '141 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '141 Patent despite knowing of the '141 Patent and its infringement thereof. Brightcove is infringing the '141 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

256. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '141 Patent.

257. As a result of Brightcove's infringement of the '141 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's

infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT VIII
INFRINGEMENT OF U.S. PATENT NO. 8,775,665

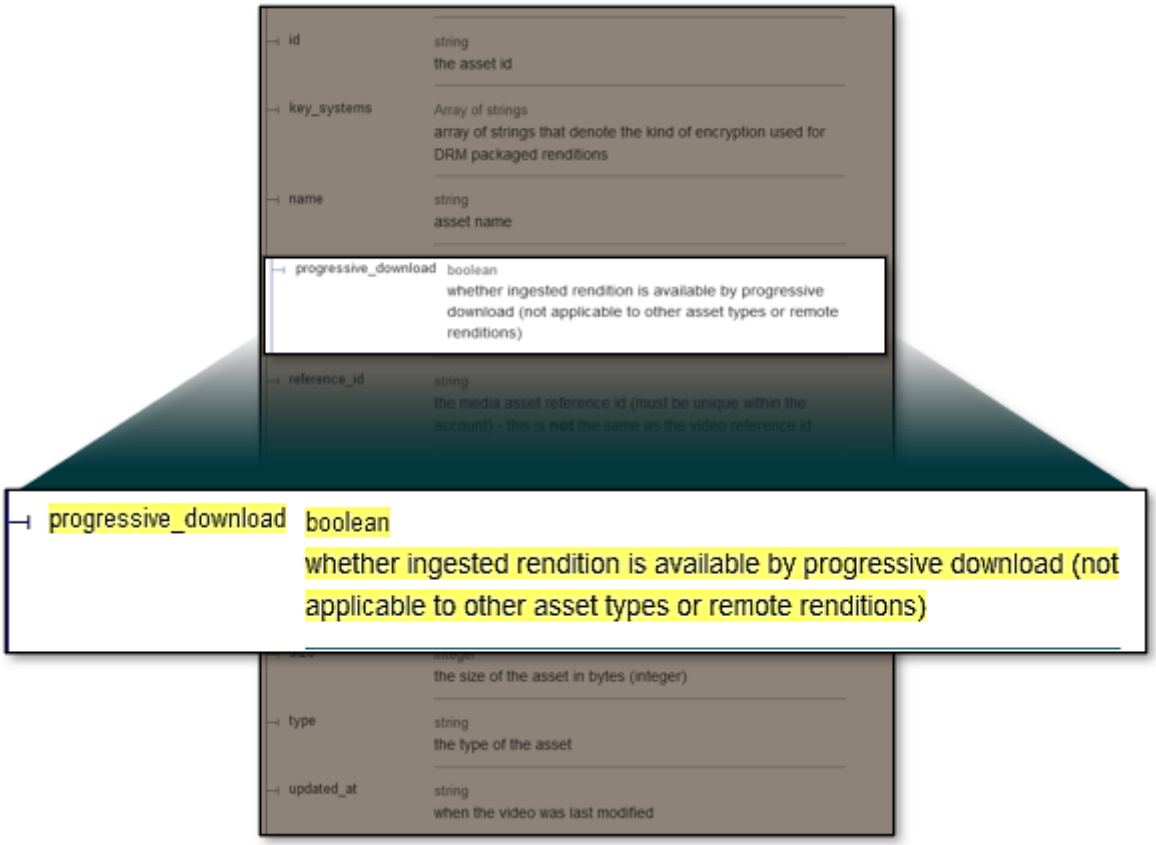
258. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

259. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for controlling the download rate of real-time streaming data.

260. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud (collectively, the "Brightcove '665 Product(s)").

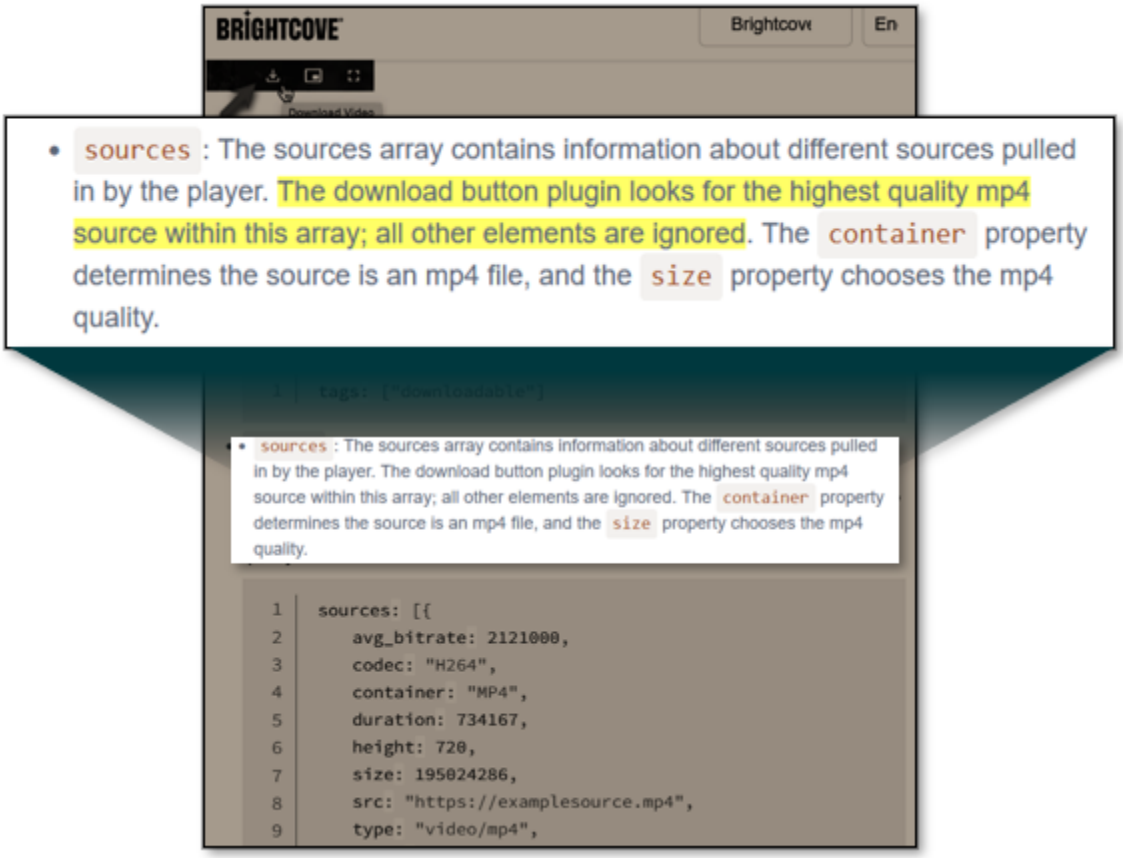
261. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '665 Products in regular business operations.

262. The Brightcove '665 Products receive media via progressive download, wherein the progressively downloaded media is requested by a media player at a mobile device, and the progressively downloaded media includes a first portion and a second portion of a plurality of media frames. Specifically, the Brightcove '665 Products receive delivery of media content through progressive download, enabling video files to be transmitted over standard HTTP protocols. When a media player on a mobile device requests a video, the Brightcove' 665 Products initiate the progressive download of a media file. The downloaded content comprises multiple segments, allowing the media player to begin playback with the initial portion while the subsequent segments continue to download in the background.



Brightcove CMS API Reference (1.0.0), BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/cms/references/reference.html (last visited January 2025) (emphasis added).

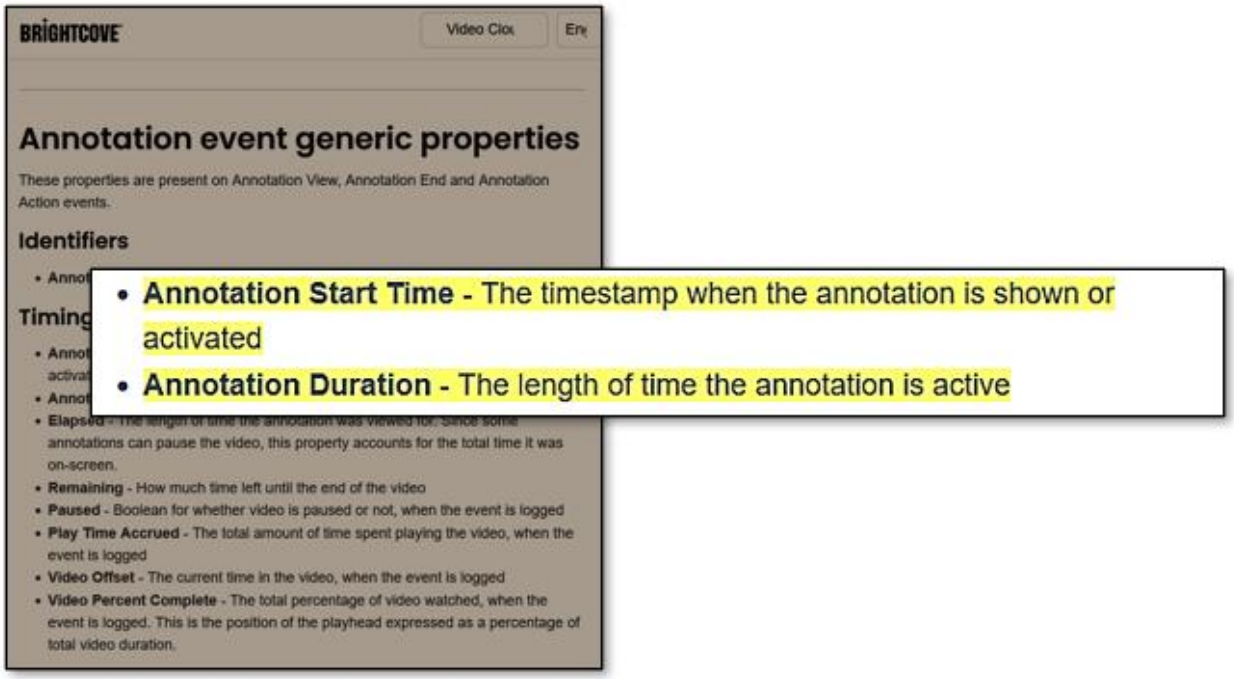
263. The Brightcove '665 Products include a Download Button Plugin that downloads the highest quality MP4 rendition of a video playing in the Brightcove Player. This download button in the Brightcove '665 Products performs the receipt of media via progressive download wherein the downloaded file is selected from an array of files as shown in the following excerpt from Brightcove documentation.



Download Button Plugin, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://player.support.brightcove.com/plugins/download-button-plugin.html (last visited January 2025) (emphasis added).

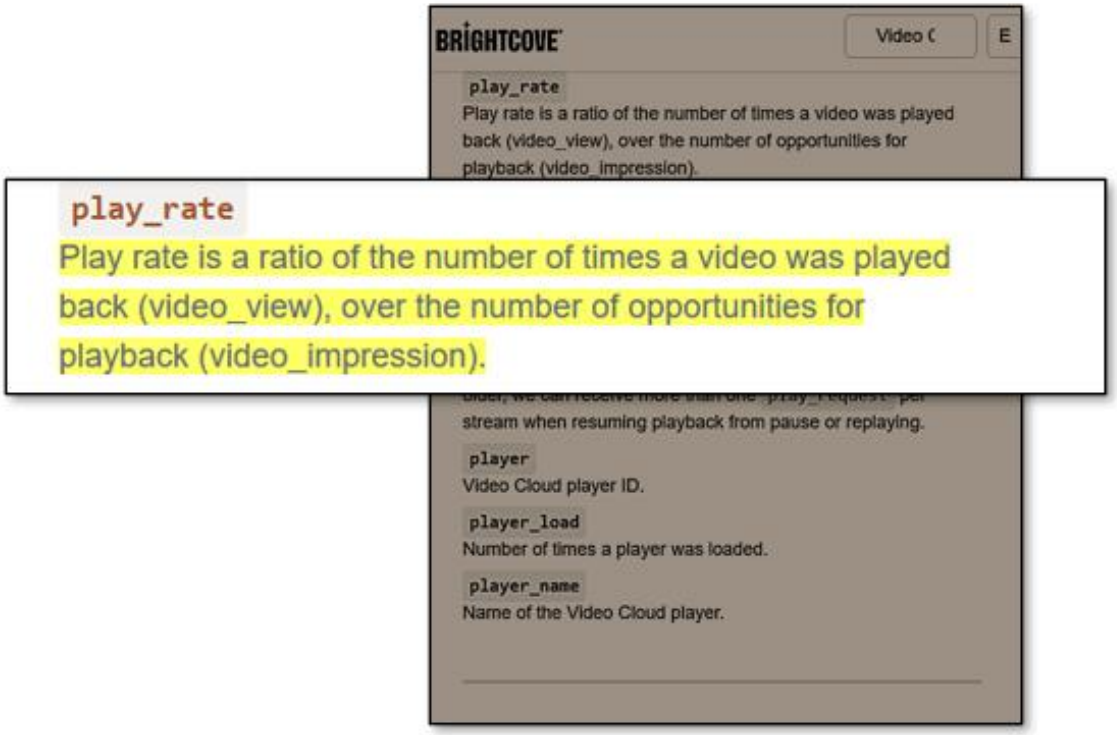
264. The Brightcove '665 Products retrieve timing information from the progressively downloaded media, wherein the plurality of media frames each carry a timestamp corresponding to a time at which the media frame is played on the media player. Specifically, the Brightcove '665 Products incorporate timing information within its video delivery process. The Brightcove '665 Products utilize timestamps for features like "Time Stamp," which allows users to start a video from a specific time offset. This functionality is achieved using a query parameter in the player's URL, enabling precise control over playback initiation. The Brightcove '665 Products track various events, including "Annotation Start Time" and "Annotation Duration," which rely on timestamps. These timestamps record when an annotation is displayed and how long it remains

active. Additionally, the Brightcove '665 Products enable a "time" parameter for all events, representing the timestamp in epoch time (milliseconds). This parameter allows for tracking of events related to video playback.



Interactive Video Tracking Events, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://studio.support.brightcove.com/interactivity/analytics/interactive-video-tracking-events.html (last visited January 2025) (emphasis added).

265. The Brightcove '665 Products determine a playback rate of the progressively downloaded media on the media player based on the timestamp associated with each media frame of the plurality of media frames. Specifically, the Brightcove '665 Products adjust playback rates. The Brightcove '665 Products include a playback rate icon in the control bar, the playback rate feature allows viewers to choose from various speed options, such as 0.5x, 1x, 1.5x, and 2x. Further, the Brightcove '665 Products calculate the "Play Rate" metric by dividing the number of video playbacks ("video_view") by the number of playback opportunities ("video_impression").



Analytics API Glossary, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/analytics/general/analytics-api-glossary.html (last visited January 2025) (emphasis added).

266. The Brightcove '665 Products frame the first portion of media frames based on the determined playback rate. Specifically, when a video is progressively downloaded, the Brightcove '665 Products begin by buffering the initial portion of the media frames. This buffering process is guided by the determined playback rate. During progressive download, the video file is delivered over standard HTTP protocols and stored in a temporary directory on the viewer's device by the Brightcove '665 Products. Playback of the video file starts as soon as enough of the file has been downloaded, framing the first portion of media frames based on the determined playback rate.

267. The Brightcove '665 Products schedule transmission of the framed progressively downloaded media based on the framing. Specifically, the Brightcove '665 Products include scheduling capabilities for live events within the Brightcove Live module. The scheduling feature

in the Brightcove '665 Products supports the creation of live events that can be set to recur at designated intervals.

268. The Brightcove '665 Products transmit the framed progressively downloaded media to the media player according to the schedule. For example, the Brightcove '665 Products include Brightcove Beacon functionality that manages, and schedules live events, including setup of live stream transmissions.

269. Brightcove has directly infringed and continues to directly infringe the '665 Patent by, among other things, making, using, offering for sale, and/or selling technology for controlling the download rate of real-time streaming data., including but not limited to the Brightcove '665 Products.

270. The Brightcove '665 Products are available to businesses and individuals throughout the United States.

271. The Brightcove '665 Products are provided to businesses and individuals located in this District.

272. By making, using, testing, offering for sale, and/or selling products and services comprising technology for controlling the download rate of real-time streaming data, including but not limited to the Brightcove '665 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '665 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

273. Brightcove has had knowledge of the '665 Patent and its infringement of the '665 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '665 Patent is well-known within the industry as demonstrated by multiple citations to the '665 Patent in published patents and patent applications assigned to technology companies

and academic institutions. Brightcove has continued to infringe the '665 Patent despite knowing of the '665 Patent and its infringement thereof. Brightcove is infringing the '665 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

274. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '665 Patent.

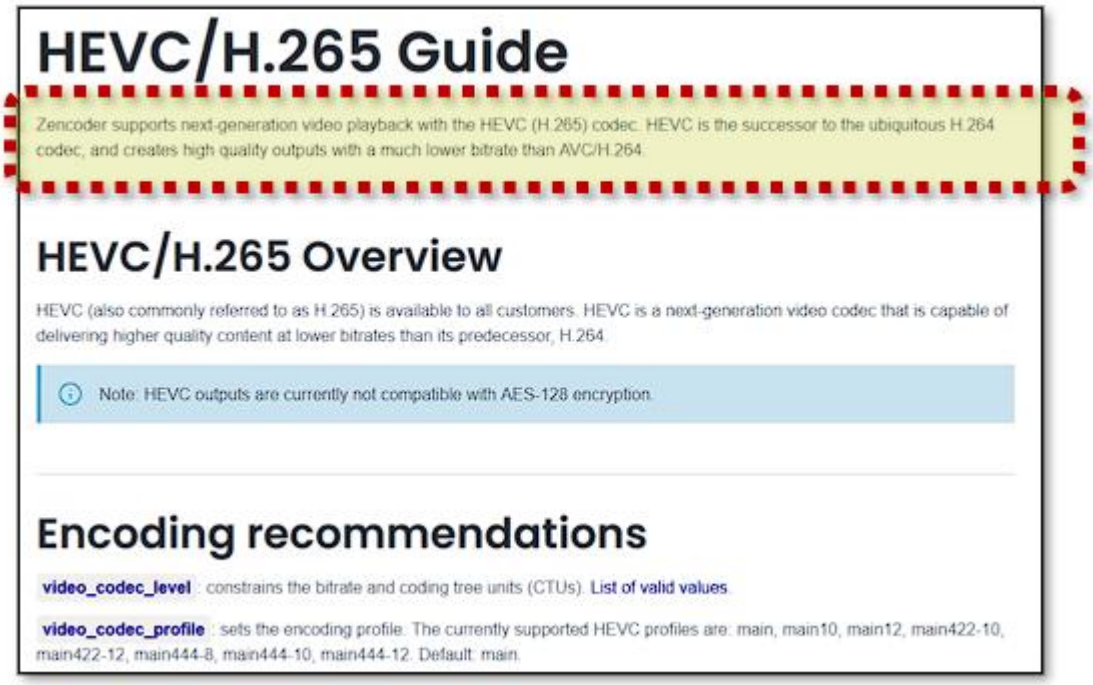
275. As a result of Brightcove's infringement of the '665 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT IX
INFRINGEMENT OF U.S. PATENT NO. 9,894,361

276. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

277. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products containing technology for quality-aware video optimization.

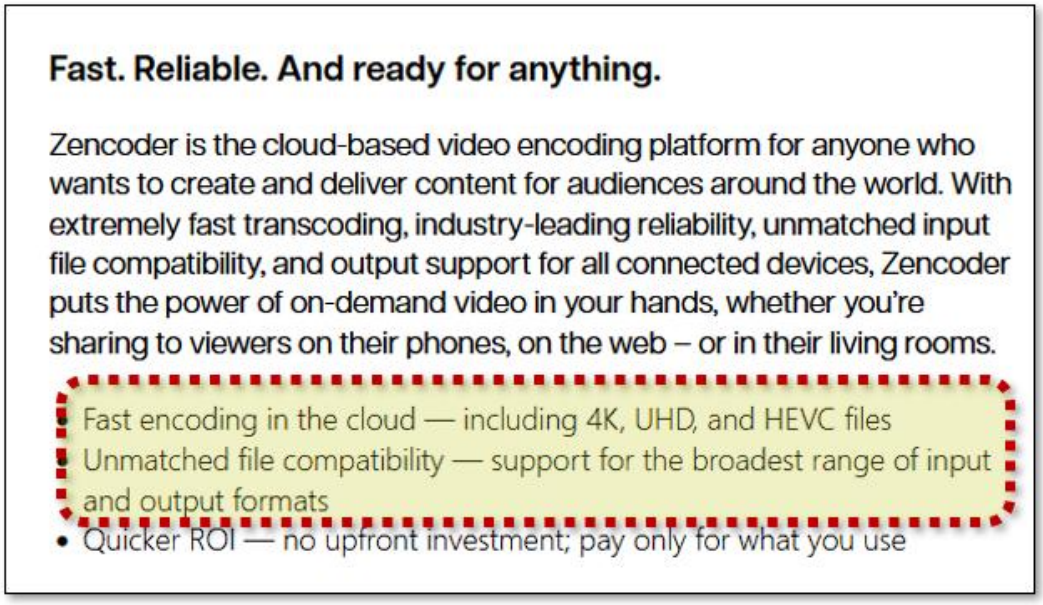
278. Brightcove designs, makes, sells, offers to sell, imports, and/or uses products for performing video processing compliant with the High Efficiency Video Coding (HEVC) standard, which is also often referred to as the H.265 standard. Brightcove products that perform video processing compliant with the HEVC/H.265 standard include, but are not limited to, Brightcove Zencoder and Brightcove Video Cloud (collectively, the "Brightcove '361 Product(s)").



Brightcove – Ingest Profiles Guide – HEVC Video, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/guides/hevc-video.html (last visited January 2025) (emphasis added).

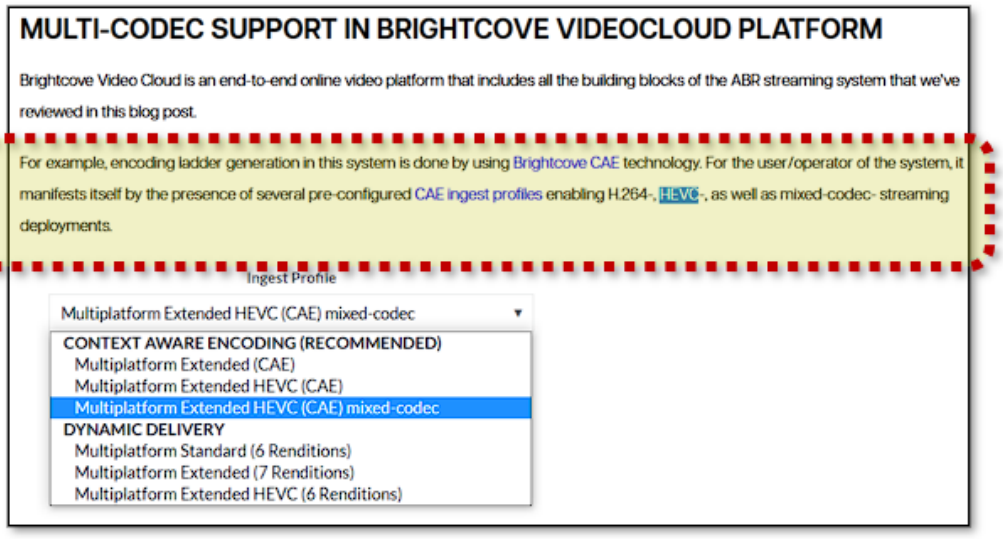
279. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '361 Products in regular business operations.

280. The Brightcove '361 Products comprise a cloud-based video encoding platform that perform "fast encoding in the cloud – including 4K, UHD, and HEVC files." This HEVC encoding function is shown in the following excerpt from Brightcove documentation.



Brightcove – Video Encoding Platform, BRIGHTCOVE WEBSITE, *available at*: https://www.brightcove.com/en/products/zencoder/ (last visited January 2025) (emphasis added).

281. The Brightcove '361 Products such as Brightcove Video Cloud enable the "creation of both HEVC and AVC encoded renditions during transcoding." The Brightcove '361 Products perform video encoding incompliance with the HEVC standard as shown in the below excerpt from Brightcove documentation.



Yuriy Reznik, How to Efficiently Stream Multi-Codec Video, BRIGHTCOVE TECH-TALK BLOG, *available at*: https://www.brightcove.com/en/resources/blog/towards-efficient-multi-codec-streaming/ (last visited January 2025) (emphasis added).

282. The Brightcove ‘361 Products unpack a compressed video frame from a series containing multiple video frames.

283. The Brightcove ‘361 Products take an encoded video frame as input. This frame is one in a series that consists of multiple frames. The encoded frame is then passed through a decoding pipeline by the Brightcove ‘361 Products. The Brightcove ‘361 Products use inverse quantization and inverse DCT (Discrete Cosine Transform) functions, to revert the video data to a decompressed state suitable for further manipulation.

284. The Brightcove ‘361 Products obtain an initial Quantization Parameter (QP) from the unpacked video frame, where this initial QP is indicative of the quantization configurations initially applied to compress the video frame.

285. The Brightcove ‘361 Products extract a first Quantization Parameter (QP) from the video frame metadata or from the bitstream itself. This first QP reflects the quantization settings initially applied during the original encoding. This first QP is read from the slice header or similar control structures and used to modulate the quantization matrices in the decoding process.

286. The Brightcove ‘361 Products calculate a delta QP influenced by the initial QP.

287. Upon acquiring the first QP, a delta QP is calculated by the Brightcove ‘361 Products. This delta QP value is computed through a set of heuristic functions to optimize for certain objectives like bitrate reduction, video quality, or computational efficiency. The delta QP acquired by the Brightcove ‘361 Products is a function of the first QP and other parameters, such as frame type (I-frame, P-frame, etc.).

288. The Brightcove ‘361 Products derive an inflation factor through comparing the total byte size of video frames after and before decompression, where both the newly received

compressed frame and those previously decompressed belong to the same series of multiple video frames.

289. The Brightcove '361 Products compute an inflation adjustment factor based on the total byte size of previously decompressed frames and those frames post-compression. This comparison aids in estimating the compression efficiency.

290. The Brightcove '361 Products acquire a subsequent QP influenced by both the delta QP and the inflation factor, wherein this subsequent QP is indicative of the quantization configurations to be applied for recompressing the unpacked frame.

291. The second QP is then acquired by the Brightcove '361 Products by combining the calculated delta QP and the inflation adjustment. This second quantization parameter acquired by the Brightcove '361 Products aims to balance the trade-offs between quality and bitrate, taking into account the information gleaned from previous frames as indicated by the inflation adjustment.

292. The Brightcove '361 Products compress the unpacked video frame utilizing the subsequent QP.

293. The decompressed video frame is re-encoded based on the second QP by the Brightcove '361 Products. The frame is then serialized into a bitstream and packaged with appropriate headers and metadata for transmission or storage.

294. Brightcove has directly infringed and continues to directly infringe the '361 Patent by, among other things, making, using, offering for sale, and/or selling technology for quality-aware video optimization, including but not limited to the Brightcove '361 Products.

295. The Brightcove '361 Products are available to businesses and individuals throughout the United States.

296. The Brightcove ‘361 Products are provided to businesses and individuals located in this District.

297. By making, using, testing, offering for sale, and/or selling products and services comprising technology for quality-aware video optimization, including but not limited to the Brightcove ‘361 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘361 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

298. Brightcove has had knowledge of the ‘361 Patent and its infringement of the ‘361 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the ‘361 Patent is well-known within the industry as demonstrated by multiple citations to the ‘361 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the ‘361 Patent despite knowing of the ‘361 Patent and its infringement thereof. Brightcove is infringing the ‘361 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

299. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘361 Patent.

300. As a result of Brightcove’s infringement of the ‘361 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT X
INFRINGEMENT OF U.S. PATENT NO. 9,749,713

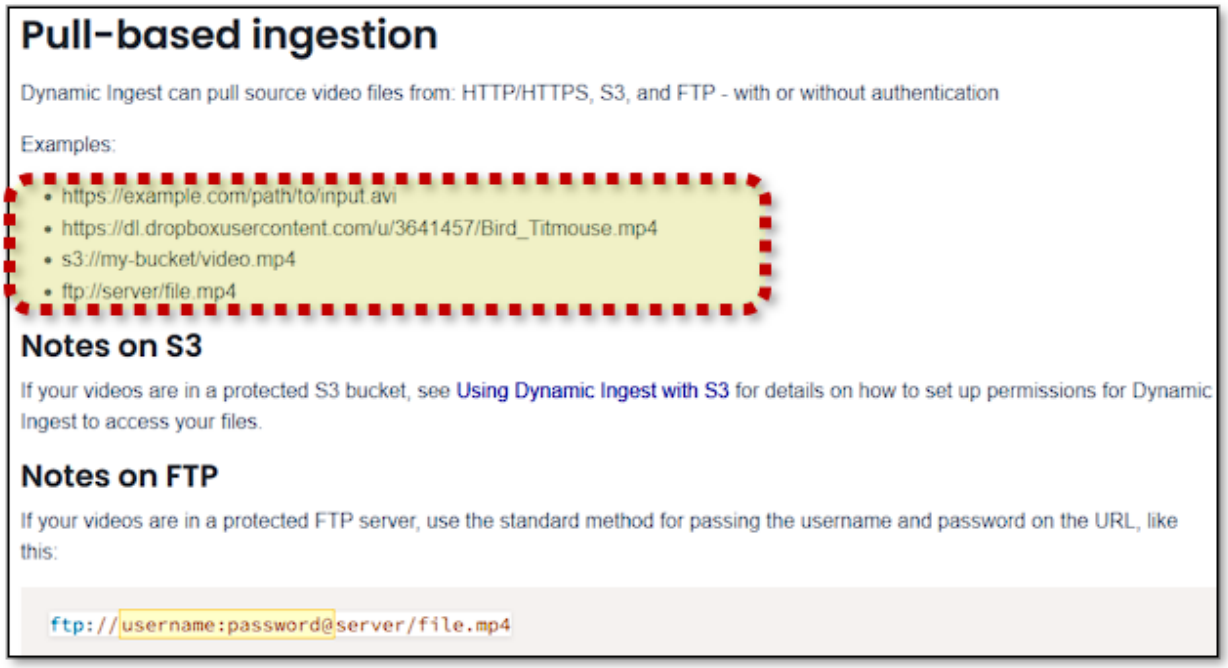
301. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

302. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for adaptive real-time streaming media frame processing.

303. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Zencoder and Brightcove Video Cloud (collectively, the "Brightcove '713 Product(s)").

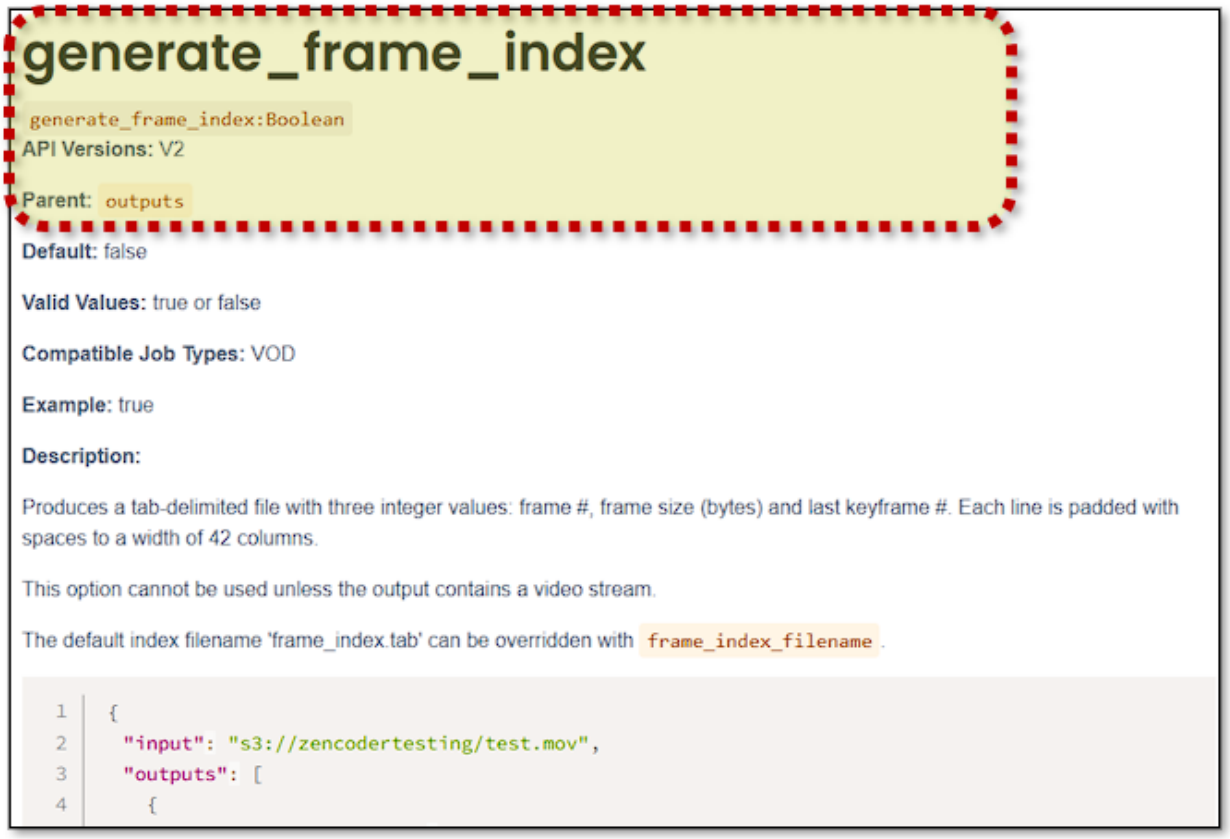
304. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '713 Products in regular business operations.

305. The Brightcove '713 Products receive, from a data network, encoded streaming media data including a plurality of media frames and a frame index specifying an original frame size and a byte offset of individual encoded frames of the plurality of media frames. Specifically, the Brightcove '713 Products support inputs from sources like HTTP/HTTPS, S3, GCS, Azure, Aspera, FTP, and SFTP, as detailed in Brightcove documentation on general output settings and various encoding guides. For example, a user can specify an input URL pointing to an S3 bucket, such as "s3://my-bucket/video.mp4."



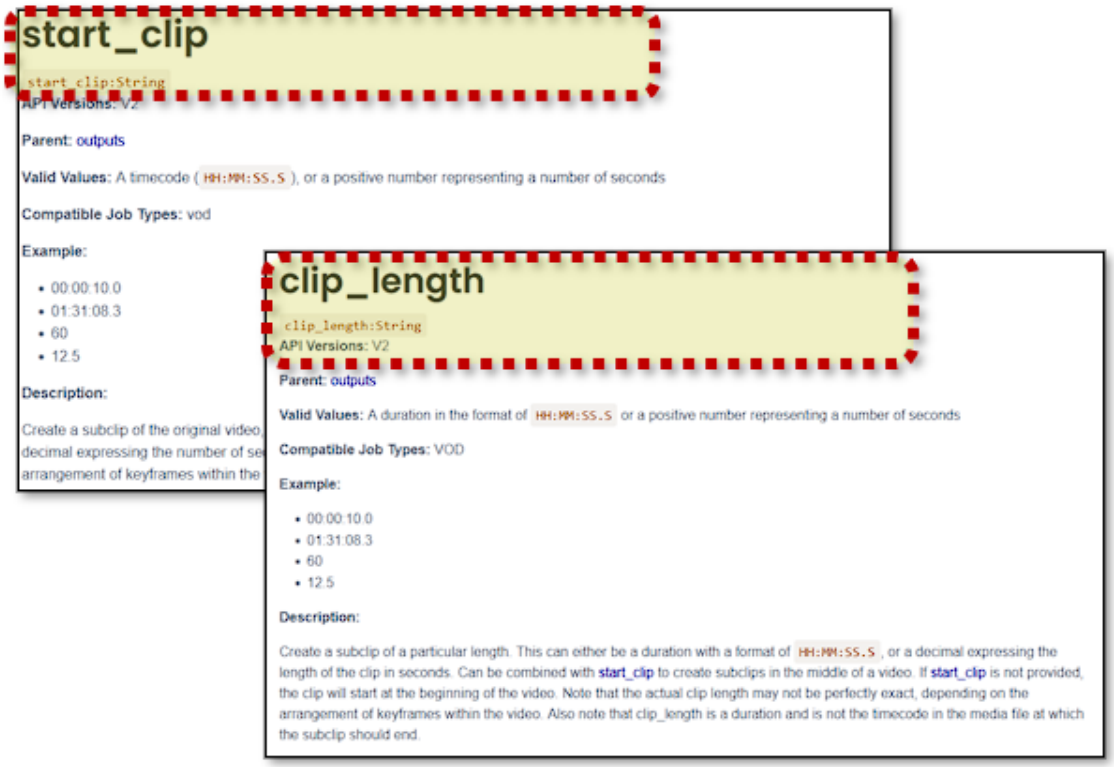
Overview: Dynamic Ingest API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/dynamic-ingest/getting-started/overview-dynamic-ingest-api-dynamic-delivery.html (last visited January 2025) (emphasis added).

306. The Brightcove '713 Products use frame-level details to manage encoding such as forced keyframes, segmenting for adaptive streaming, and thumbnail extraction. Specifically, Brightcove documentation references parameters like forced_keyframe_rate and fixed_keyframe_interval that require an internal mapping of each frame's position and size. For example, when creating ad cue points or clip extractions, the Brightcove '713 Products identify the exact byte offsets and boundaries of keyframes in the source video. The Brightcove '713 Products also generate a frame index output file, showing the Brightcove '713 Products access frame-level metadata within the source stream. Specifically, settings such as generate_frame_index show the Brightcove '713 Products track original frame during ingestion.



Frame Rate Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-frame-rate.html (last visited January 2025) (emphasis added).

307. The Brightcove '713 Products receive frame-level information when handling encoding. The Brightcove '713 Products process incoming media streams by recognizing individual frames and their boundaries. For instance, the start_clip and clip_length parameters allow users to define specific portions of the video based on timecodes. Furthermore, the generate_frame_index setting directly supports the creation of a file specifying frame sizes and keyframe positions.

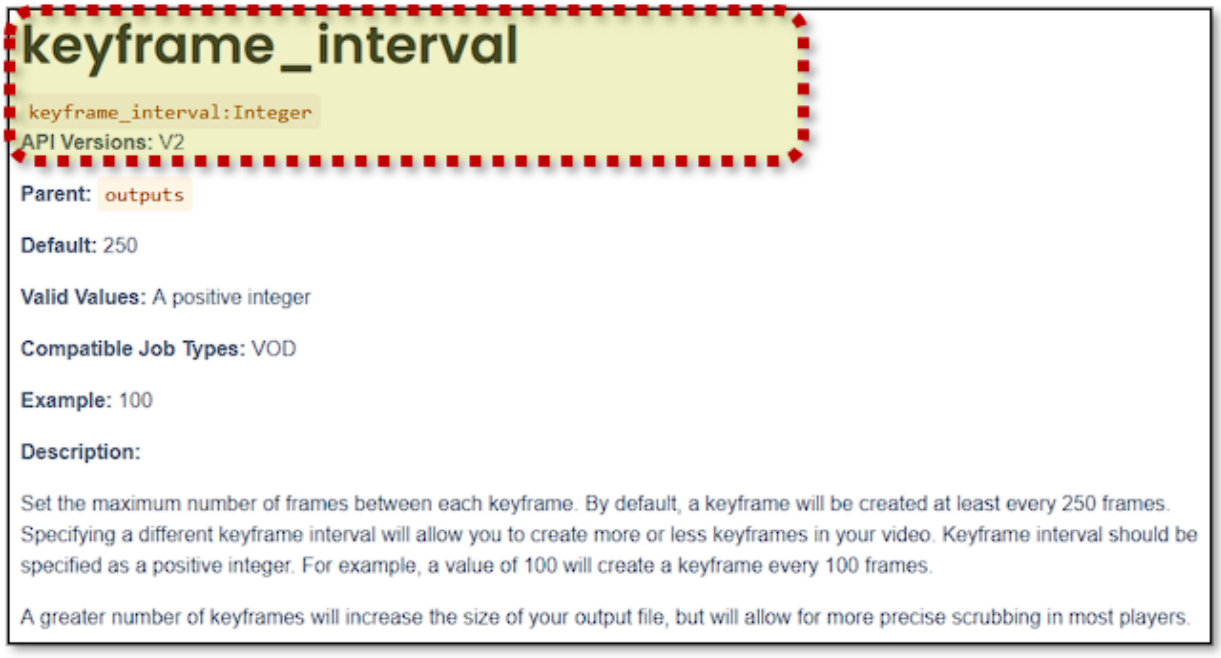


Clip Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/assets/encoding-settings-clips.html (last visited January 2025) (emphasis added).

308. The Brightcove '713 Products allocate a frame budget for an output media frame to generate an output frame index, by estimating a frame size of the output media frame based on a respective original frame size in the frame index. Specifically, parameters such as video_bitrate, max_video_bitrate, decoder_bitrate_cap, and decoder_buffer_size govern how bits are distributed per frame. For example, when max_video_bitrate is set at 3000 kbps, the Brightcove '713 Products set individual frames or GOP segments to not this target. The Brightcove '713 Products calculates an allowable bit "budget" to maintain target quality within set bandwidth parameters. Specifically, the Brightcove '713 Products contain Content-Aware Encoding functionality that adjusts resolution and bitrate based on the complexity of the input—a lower-complexity scene might result in smaller frame sizes, while a highly complex scene triggers higher bit allocation up to the prescribed maximum.

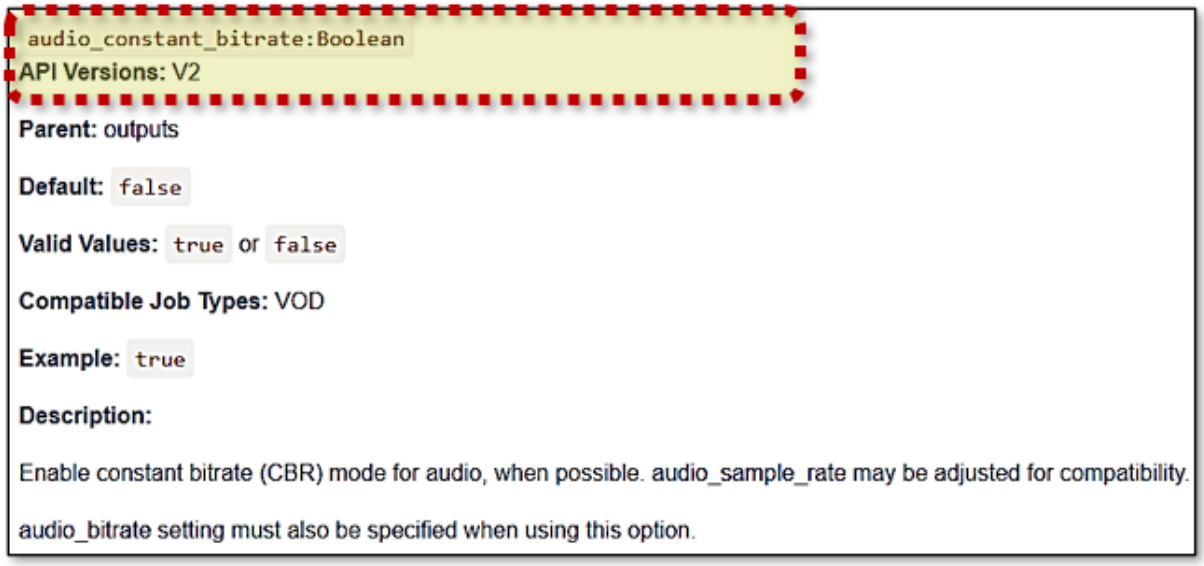
309. The Brightcove '713 Products perform rate-control wherein the original content's complexity is correlated with the desired encoding settings to approximate how large each newly encoded frame should be. For example, by analyzing motion vectors, texture detail, and other encoding parameters during the initial pass, the Brightcove '713 Products assign a bit budget that ensures frames remain within the designated size range.

310. The Brightcove '713 Products generate the output media frame in real-time by processing the media frame based on first processing parameters. Specifically, the Brightcove '713 Products contain functionality such as Brightcove Live which ingests live video feeds and transcodes them into multiple renditions. The Brightcove '713 Products apply an initial set of processing parameters—such as codec choice, resolution, and bitrate targets—to incoming frames. Specifically, the Brightcove '713 Product reference user-defined job settings like frame_rate, quality, and keyframe_interval to encode each arriving frame under these parameters.



Frame Rate Settings, Brightcove Support Website, available at: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-frame-rate.html (last visited January 2025) (emphasis added).

311. The Brightcove '713 Products, in response to the allocated frame budget being greater than a frame size of the processed media frame, pad the processed media frame. Specifically, the Brightcove '713 Products manage data allocation to meet specified output parameters, which include the use of padding. When using constant bitrate (CBR) encoding for audio, the Brightcove '713 Products ensure a consistent bitrate by adding padding as needed, as indicated by the audio_constant_bitrate parameter.

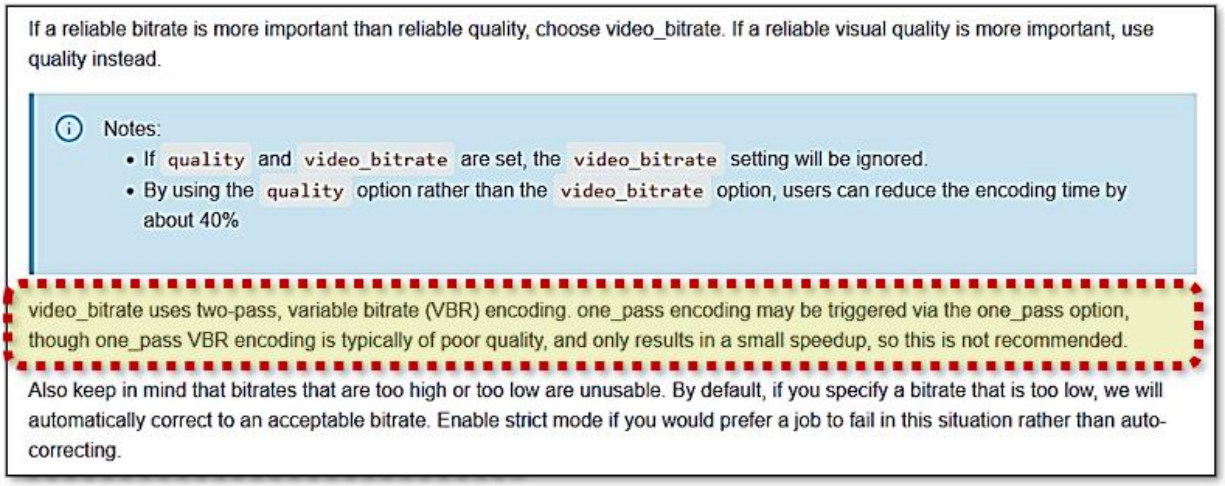


Rate Control Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-rate-control.html (last visited January 2025) (emphasis added).

312. The Brightcove '713 Products use segmented outputs, particularly for HLS and DASH. The use of these segmented outputs requires that during encoding the output process encodes at the specified segment_seconds and bitrate. The use of segmented outputs by the Brightcove '713 Products requires that data allocation within each segment is set at a specific bitrate and quality. The use of segmented outputs by the Brightcove '713 Products is evidenced by the use of parameters like decoder_bitrate_cap and decoder_buffer_size, which control the maximum bitrate and buffer size for the decoder.

313. The Brightcove ‘713 Products in response to the allocated frame budget being less than a frame size of the processed media frame, determine second processing parameters based on the frame budget and the first processing parameters, re-process the media frame based on the second processing parameters and, in response to the allocated frame budget being greater than a frame size of the re-processed media frame, pad the re-processed media frame. The Brightcove ‘713 Products perform multi-pass encoding and adaptive quality settings, to reprocess or adjust frames that exceed the allocated bit budget. Specifically, Brightcove ‘713 Products’ two-pass encoding analyzes the entire input during the first pass, then revises encoding decisions in the second pass to keep frame sizes within constraints. If the initial pass detects complex motion or texture, the Brightcove ‘713 Products recalculate the quantization parameters to avoid oversized frames. For example, if video data has an encoding bitrate on initial pass that is higher than the estimated bitrate, the Brightcove ‘713 Products lower the resolution or increase the allowed bitrate so subsequent data frames do not exceed present thresholds. The Brightcove ‘713 Products use of parameters such as min_renditions, max_renditions, max_bitrate, and others within cae_options shows the adjustment of processing parameters by the Brightcove ‘713 Products.

314. Further, the Brightcove ‘713 Products perform the “re-processing” of frames within the live or near-real-time grouping using adaptive rate control. Specifically, rather than letting frames continuously overshoot targets, the Brightcove ‘713 Products recalibrate key encoding parameters (like delta QP) to ensure subsequent frames comply with the budget. For example, after detecting an oversize spike, the Brightcove ‘713 Products adjust quantization parameters upward for subsequent frames - maintaining bitrate thresholds over the encoding of a portion of media data.



Rate Control Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-rate-control.html (last visited January 2025) (emphasis added).

315. The Brightcove '713 Products provide the output media frame. Specifically, the Brightcove '713 Products output media frames through various delivery methods, including segmented outputs for HLS and DASH, as well as direct file uploads to destinations like S3, FTP, and Aspera. For example, when creating HLS outputs, the Brightcove '713 Products generate .m3u8 playlist files and corresponding .ts segment files, demonstrating its ability to package and deliver output media frames.

316. Brightcove has directly infringed and continues to directly infringe the '713 Patent by, among other things, making, using, offering for sale, and/or selling technology for adaptive real-time streaming media frame processing, including but not limited to the Brightcove '713 Products.

317. The Brightcove '713 Products are available to businesses and individuals throughout the United States.

318. The Brightcove '713 Products are provided to businesses and individuals located in this District.

319. By making, using, testing, offering for sale, and/or selling products and services comprising technology for adaptive real-time streaming media frame processing, including but not limited to the Brightcove '713 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '713 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

320. Brightcove has had knowledge of the '713 Patent and its infringement of the '713 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '713 Patent is well-known within the industry as demonstrated by multiple citations to the '713 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '713 Patent despite knowing of the '713 Patent and its infringement thereof. Brightcove is infringing the '713 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

321. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '713 Patent.

322. As a result of Brightcove's infringement of the '713 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT XI
INFRINGEMENT OF U.S. PATENT NO. 8,429,169

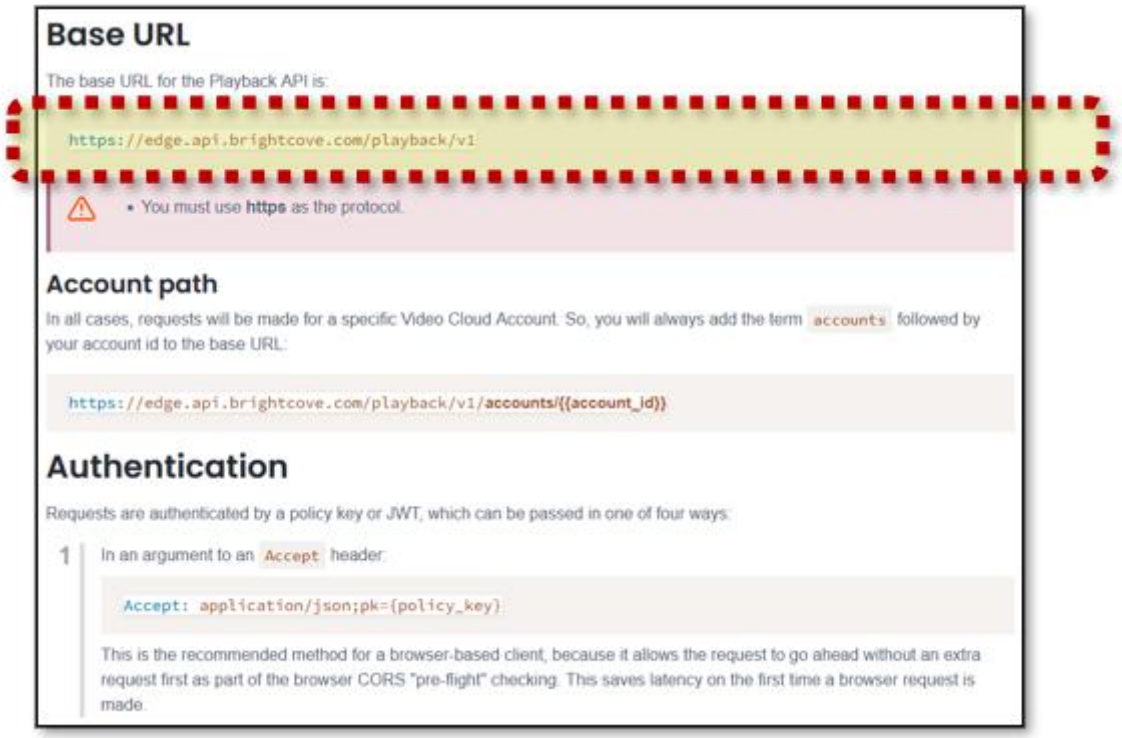
323. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

324. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for video cache indexing.

325. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Video Cloud (collectively, the "Brightcove '169 Product(s)").

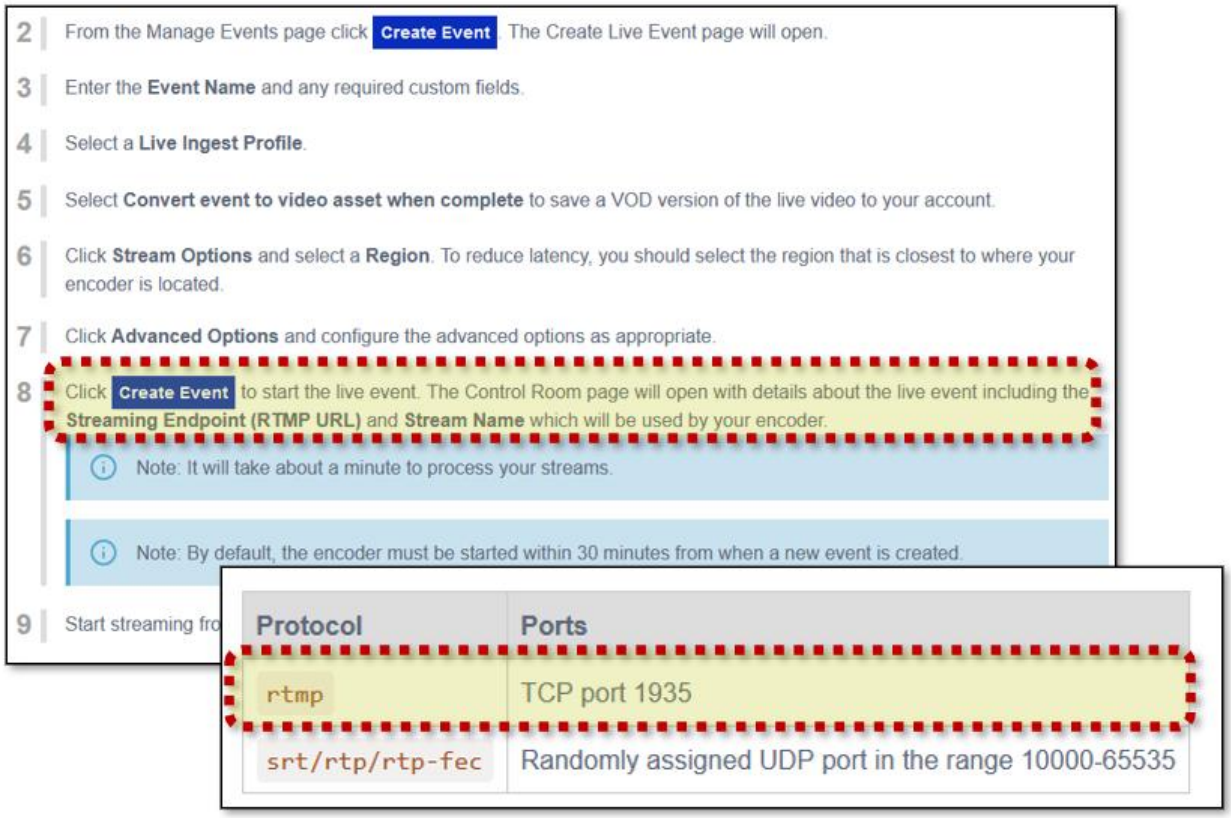
326. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '169 Products in regular business operations.

327. The Brightcove '169 Products receive content requests from user Internet-connected devices. Specifically, the Brightcove '169 Products accept incoming requests formatted according to the HTTP standard, originating from a variety of client devices, including desktop browsers, mobile devices, and connected TVs. For instance, when a user interacts with the Brightcove '169 Products, the Brightcove '169 Products initiate a series of HTTP requests to retrieve video content and associated metadata. These requests are directed to the Brightcove Playback API, which has a base URL of https://edge.api.brightcove.com/playback/v1. The API processes these requests and delivers the appropriate video streams based on the parameters provided in the request.



Overview: Playback API, BRIGHTCOVE SUPPORT WEBSITE, available at: https://apis.support.brightcove.com/playback/getting-started/overview-playback-api.html (last visited January 2025) (emphasis added).

328. The Brightcove '169 Products accept requests through various protocols, including RTMP, SRT, RTP and RTP-FEC. For example, when creating a live event, the Brightcove '169 Products provide a "Streaming Endpoint (RTMP URL)" and "Stream Name" to be used by the encoder. Specifically, the encoder uses this information to initiate a connection and send a stream to the Live platform. The Brightcove '169 Products receives the RTMP stream on port 1935. In addition, the platform supports "Input Format" for "Secure Reliable Transport (SRT)," which causes the Brightcove '169 Products to use the "srt" protocol.



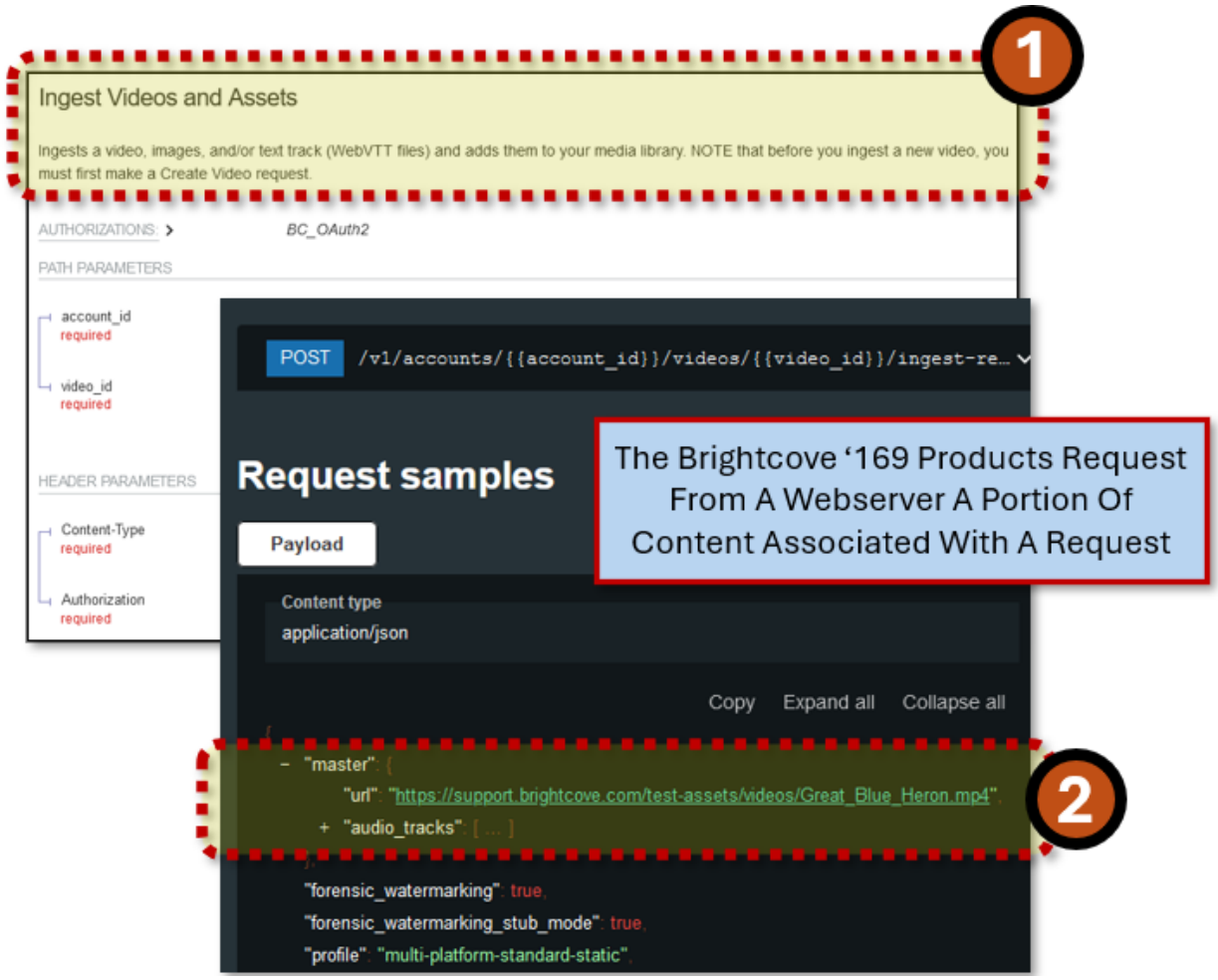
Brightcove: Live module, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://live.support.brightcove.com/live-module/using-live-rtmp-outputs-stream-facebook-and-youtube.html#facebook (last visited January 2025) (emphasis added) and *Domains and Ports that Must Be Accessible to Video Cloud*, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://studio.support.brightcove.com/general/architecture/domains-and-ports-must-be-accessible-video-cloud.html (last visited January 2025) (emphasis added).

329. The Brightcove '169 Products use the Brightcove CMS API which receives requests for video and playlist data and metadata. Specifically, requests to Brightcove '169 Products' endpoints such as /v1/accounts/{account_id}/videos retrieve lists of videos and requests to /v1/accounts/{account_id}/videos/{video_id} retrieve individual video data. The Brightcove '169 Products authenticate these requests using OAuth2 access tokens, as detailed in the below excerpted Brightcove documentation.

Overview: Playback API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/playback/getting-started/overview-playback-api.html (last visited January 2025) (emphasis added).

330. The Brightcove '169 Products request from a web server a portion of content associated with the received content request. The Brightcove '169 Products perform the retrieval of specific video content portions from a web server in response to user requests. Specifically, the Brightcove '169 Products use the Dynamic Ingest API to pull video source files from -defined storage locations. For instance, when the Brightcove '169 Products initiate a Dynamic Ingest request, a "url" parameter is specified within the request body, which indicates the location of the source video file, such as "https://support.brightcove.com/test-assets/videos/Great_Blue_Heron.mp4." An example of how the Brightcove '169 Products perform this step is shown in the below excerpts from Brightcove documentation. In addition, the Dynamic Ingest

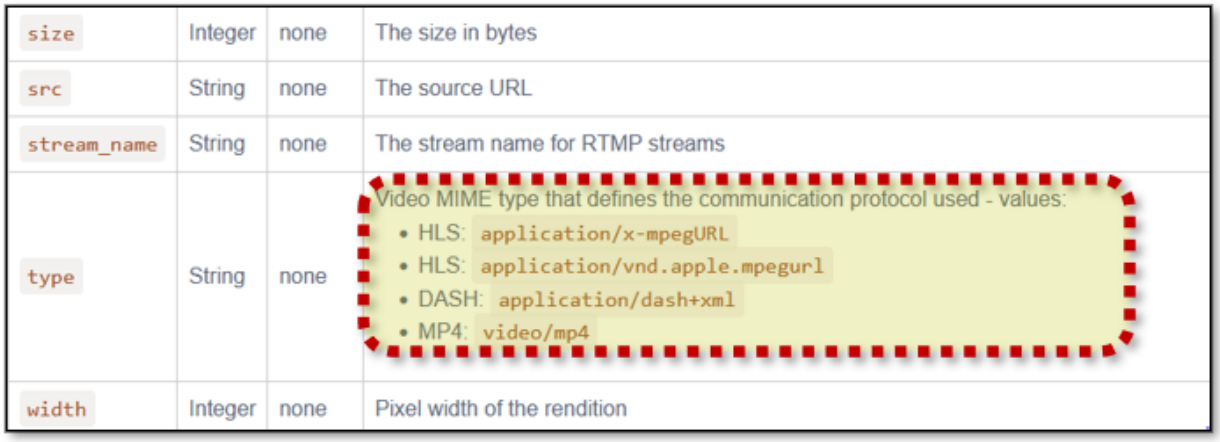
API used by the Brightcove '169 Products support various protocols for accessing source files, including HTTP/HTTPS and S3.



Dynamic Ingest API Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/dynamic-ingest/references/reference.html (last visited January 2025) (annotation added).

331. The Brightcove '169 Products identify at least one characterization data for content associated with the received content request, wherein the at least one characterization data comprises the portion of content associated with the received content request. The Brightcove '169 Products perform just-in-time packaging of content for delivery. When playback requests are received by the Brightcove '169 Products, Brightcove dynamically determines the appropriate format for delivery based on factors such as device type, operating system, and browser. The

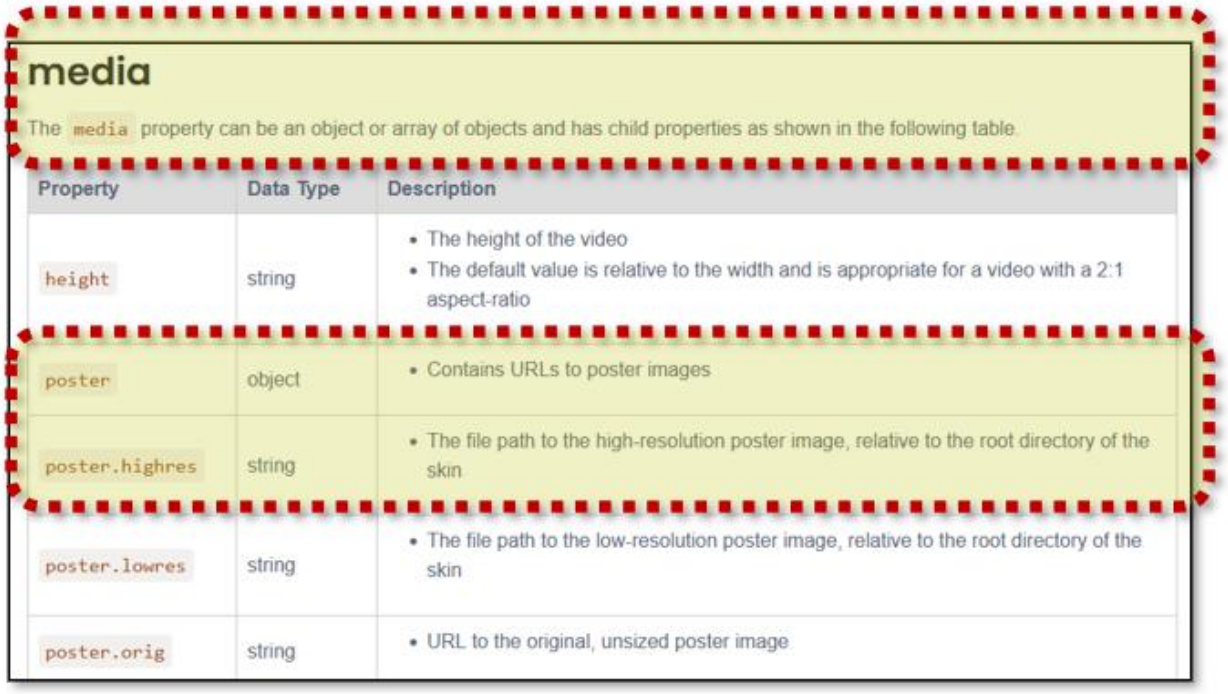
Brightcove '169 Products use the Playback API to retrieve corresponding manifest files, which contains URLs pointing to the video segments. The Brightcove '169 Products use various manifest formats, including "application/x-mpegURL" for HLS and "application/dash+xml" for DASH as shown in the following excerpt from Brightcove documentation.



`size`	Integer	none	The size in bytes
`src`	String	none	The source URL
`stream_name`	String	none	The stream name for RTMP streams
`type`	String	none	Video MIME type that defines the communication protocol used - values: • HLS: `application/x-mpegURL` • HLS: `application/vnd.apple.mpegurl` • DASH: `application/dash+xml` • MP4: `video/mp4`
`width`	Integer	none	Pixel width of the rendition

Video Fields Reference, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/playback/references/playback-api-video-fields-reference.html (last visited January 2025) (emphasis added).

332. In addition to standard video content retrieval, the Brightcove '169 Products perform the requesting from a web server of a portion of content associated with a received content request such as static image assets associated with video content. Upon receiving a request for a video, the Brightcove '169 Products retrieve associated image assets, such as static images, from a designated location. For example, the request body may include parameters like "poster": { "url": "https://example.com/poster.jpg", "width": 1280, "height": 720 }, specifying the URL, width, and height of a poster image to be fetched along with the video content. The below documentation shows how the Brightcove '169 Products perform the step of requesting this associated content including PNG and JPG files.



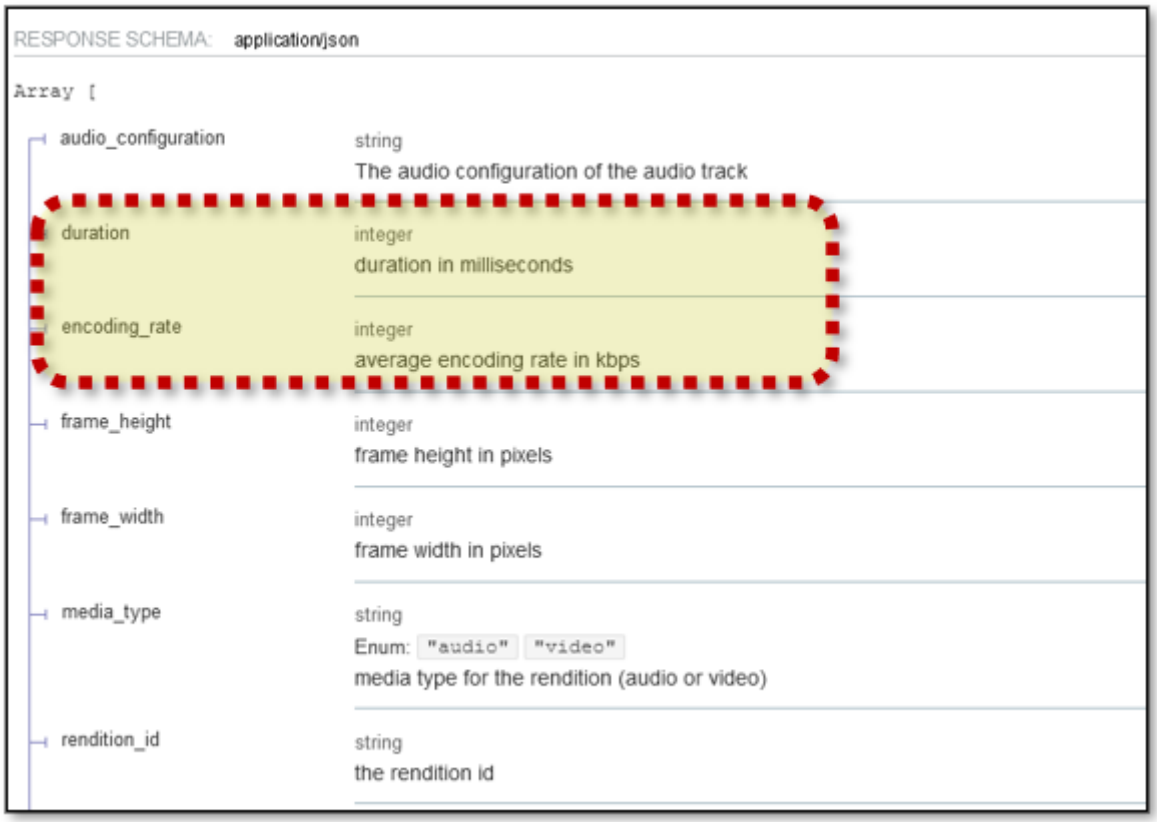
media

The media property can be an object or array of objects and has child properties as shown in the following table

Property	Data Type	Description
height	string	• The height of the video • The default value is relative to the width and is appropriate for a video with a 2:1 aspect-ratio
poster	object	• Contains URLs to poster images
poster.highres	string	• The file path to the high-resolution poster image, relative to the root directory of the skin
poster.lowres	string	• The file path to the low-resolution poster image, relative to the root directory of the skin
poster.orig	string	• URL to the original, unsized poster image

Player Configuration Guide, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://player.support.brightcove.com/references/player-configuration-guide.html (last visited January 2025) (emphasis added).

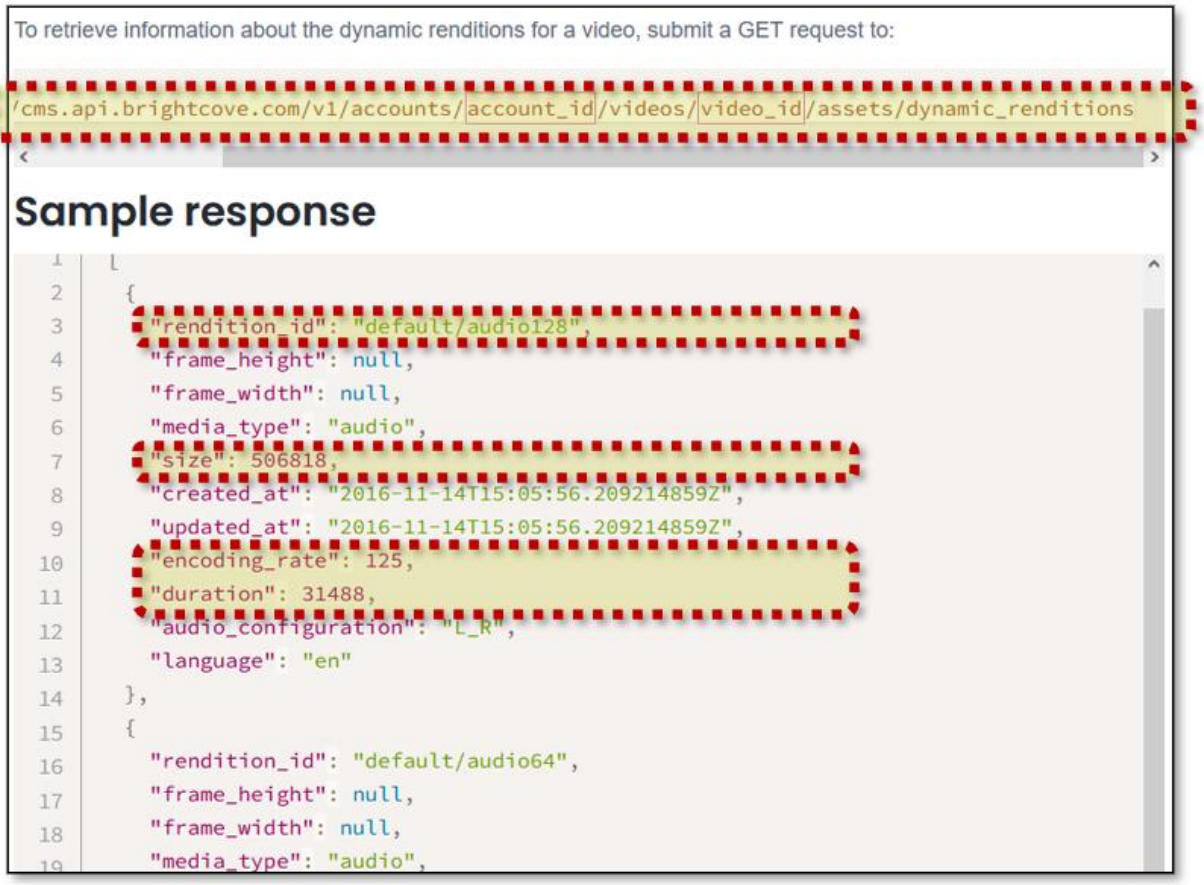
333. The Brightcove '169 Products identify characterization data associated with both entire video assets and their constituent portions (*i.e.*, renditions, segments, etc.). Specifically, the Brightcove '169 Products use metadata including "name," "description," "tags," "reference_id," and "custom_fields" to identify characterization data for content associated with content requests. For example, the Brightcove '169 Products identify characterization data such as the "duration" parameter, expressed in milliseconds. This metadata is used for content organization, search, and retrieval, as detailed in Brightcove documentation. Specifically, the CMS API enables programmatic access to this data for integration and management purposes, while the Playback API provides this data for client-side applications and players.



Brightcove CMS API Reference 1.0.0, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/cms/references/reference.html#tag/Media-Assets/operation/GetDynamicRenditions (last visited January 2025) (emphasis added).

334. The Brightcove '169 Products identify characterization data associated with individual renditions (different encoded versions of a video optimized for varying bandwidths and resolutions). Specifically, the "sources" array used by the Brightcove '169 Products API contains objects with properties like "src" (the rendition URL), "type" (the media type, such as "application/x-mpegURL" for HLS or "video/mp4" for MP4), "width," "height," "avg_bitrate," and "duration." For example, these properties characterize specific portions of the video content tailored for different playback scenarios. In addition, for Dynamic Delivery content, the "dynamic_renditions" array, retrieved via the Brightcove '169 Products API, provides detailed metadata for each dynamically generated rendition. This includes "rendition_id,"

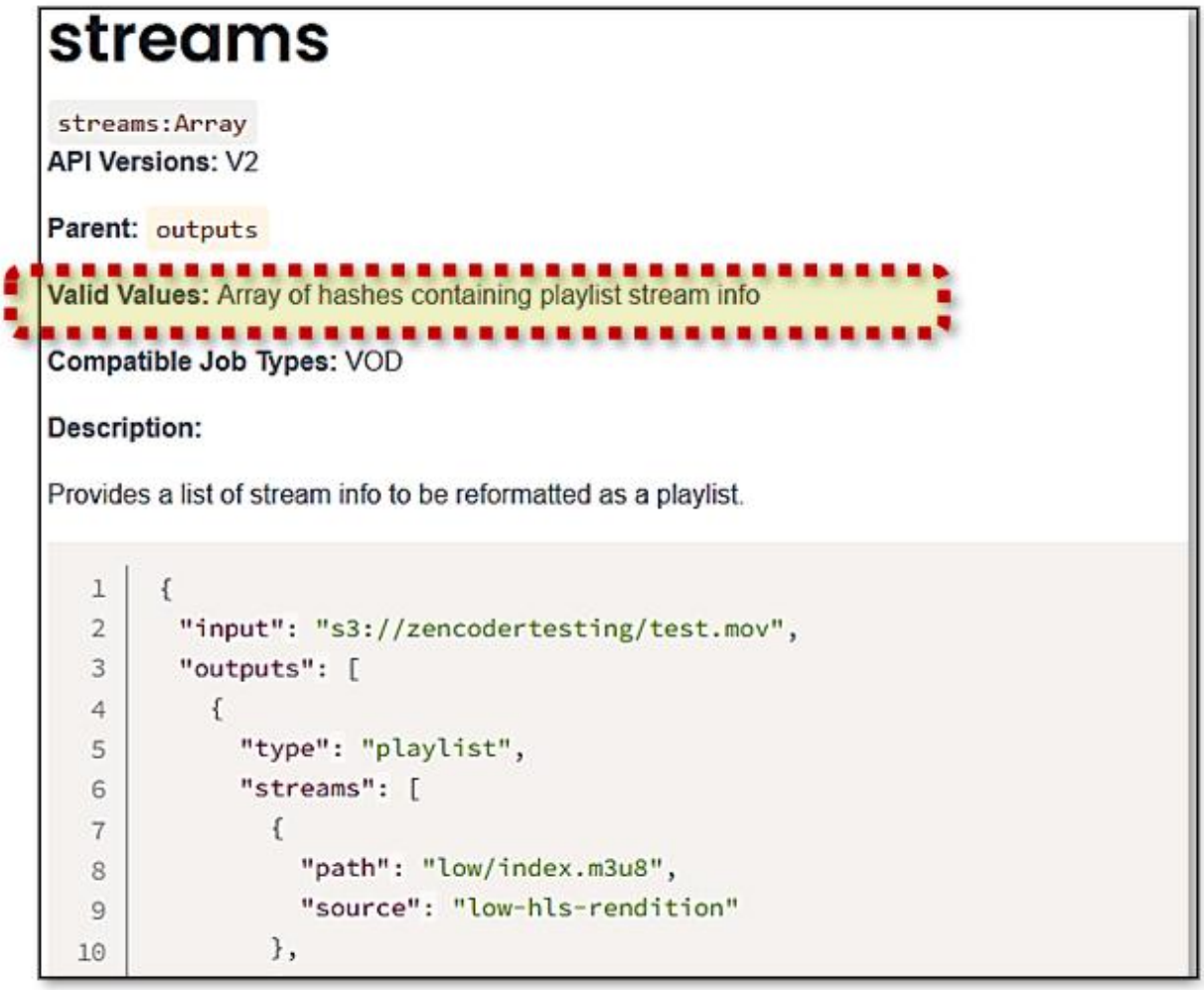
"encoding_rate," "size," "duration," and other relevant properties, enabling precise identification of video segments.



Overview: Dynamic Ingest API, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/dynamic-ingest/getting-started/overview-dynamic-ingest-api-dynamic-delivery.html (last visited January 2025) (emphasis added).

335. The Brightcove '169 Products generate an index corresponding to content associated with the received content request by inputting the at least one identified characterization data into a hash function, wherein the generated index is used for identifying, in the cache data structure, an entry associated with the content by comparing the generated index to one or more index fields associated with one or more entries within the cache data structure. Specifically, the Brightcove '169 Products generate unique indices by applying hash functions to multiple types of characterization data, including manifest parameters, authorization tokens (both policy keys and

JWTs), and device capability information. The identified characterization data (*e.g.*, video or playlist IDs, geographic restrictions, and delivery rules), are hashed into an index key by the Brightcove '169 Products. The Brightcove '169 Products utilize this generated index as the key for identifying, in a cache data structure, an entry associated with the content.



Segmented Streaming Settings, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://zencoder.support.brightcove.com/encoding-settings/general-audio-video/encoding-settings-segmented-streaming.html (last visited January 2025) (emphasis added).

336. The Brightcove '169 Products perform a cache lookup by comparing generated indices against existing cache entries. Specifically, when processing a content request, the Brightcove '169 Products utilize the authorization token (specified as a url parameter

"access_token" or in the Authorization header) and the constructed URL containing manifest data, to perform cache lookups. This index based comparison will first look for the exact match and will next, in the case that a policy key is presented, check if an alternative manifest is cached with the same policy key. The Brightcove '169 Products execute this index-based cache comparison to enable rapid content retrieval.

Short Manifest TTL, BRIGHTCOVE SUPPORT WEBSITE, *available at*: hhttps://apis.support.brightcove.com/playback/guides/short-manifest-ttl.html (last visited January 2025) (emphasis added).

337. Brightcove has directly infringed and continues to directly infringe the '169 Patent by, among other things, making, using, offering for sale, and/or selling technology comprising video cache indexing, including but not limited to the Brightcove '169 Products.

338. The Brightcove '169 Products are available to businesses and individuals throughout the United States.

339. The Brightcove '169 Products are provided to businesses and individuals located in this District.

340. By making, using, testing, offering for sale, and/or selling products and services comprising technology for video cache indexing, including but not limited to the Brightcove '169 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '169 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

341. Brightcove has had knowledge of the '169 Patent and its infringement of the '169 Patent since at least service of the Original Complaint in this action or shortly thereafter. Moreover, the '169 Patent is well-known within the industry as demonstrated by multiple citations to the '169 Patent in published patents and patent applications assigned to technology companies and academic institutions. Brightcove has continued to infringe the '169 Patent despite knowing of the '169 Patent and its infringement thereof. Brightcove is infringing the '169 Patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

342. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '169 Patent.

343. As a result of Brightcove's infringement of the '169 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

COUNT XII
INFRINGEMENT OF U.S. PATENT NO. 10,412,388

344. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

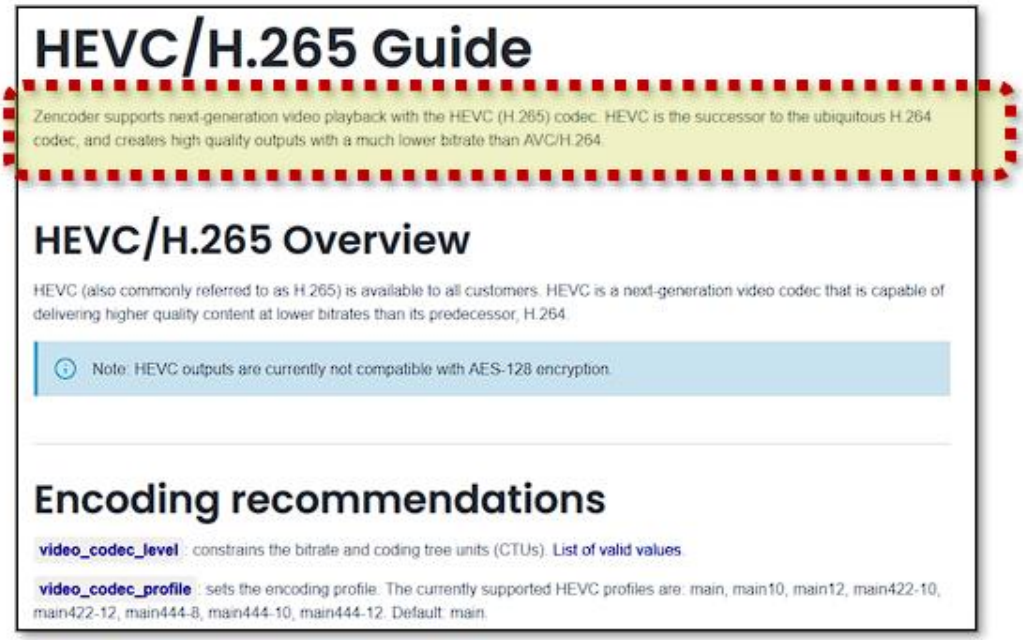
345. Brightcove designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for video compression using adaptive re-quantization using extracted and derived quantization parameters.

346. Brightcove designs, makes, sells, offers to sell, imports, and/or uses products for performing video processing compliant with the High Efficiency Video Coding (HEVC) standard, which is also often referred to as the H.265 standard. Brightcove products that perform video

processing compliant with the HEVC/H.265 standard include, but are not limited to, Brightcove Zencoder and Brightcove Video Cloud (collectively, the "Brightcove '388 Product(s)").

347. Brightcove designs, makes, sells, offers to sell, imports, and/or uses Brightcove '388 products that comply with the H.265 video encoding standard.

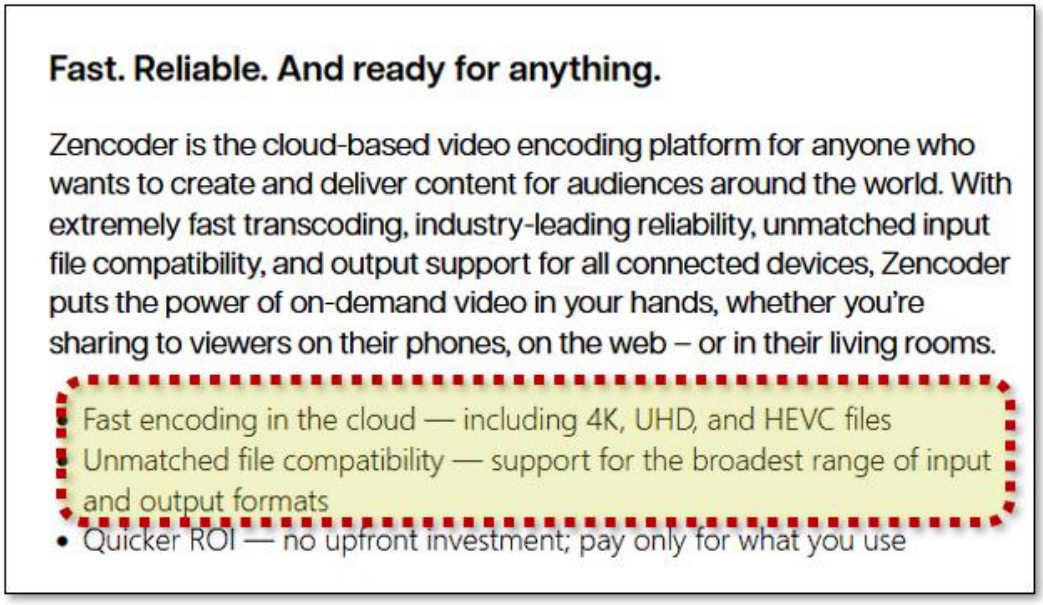
348. The Brightcove '388 Products perform video processing compliant with the High Efficiency Video Coding (HEVC) standard, which is also often referred to as the H.265 standard. Specifically, the Brightcove '388 products perform HEVC encoding.



Brightcove – Ingest Profiles Guide – HEVC Video, BRIGHTCOVE SUPPORT WEBSITE, *available at*: https://apis.support.brightcove.com/ingest-profiles/guides/hevc-video.html (last visited January 2025) (emphasis added).

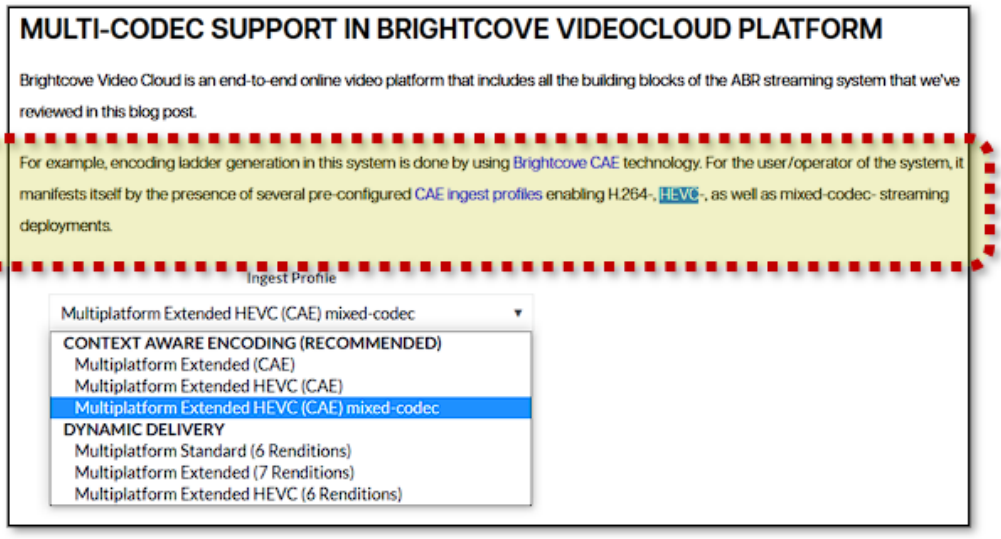
349. One or more Brightcove subsidiaries and/or affiliates use the Brightcove '388 Products in regular business operations.

350. The Brightcove '388 Products comprise a cloud-based video encoding platform that perform "fast encoding in the cloud – including 4K, UHD, and HEVC files." This HEVC encoding function is shown in the following excerpt from Brightcove documentation.



Brightcove – Video Encoding Platform, BRIGHTCOVE WEBSITE, *available at*: https://www.brightcove.com/en/products/zencoder/ (last visited January 2025) (emphasis added).

351. The Brightcove '388 Products such as Brightcove Video Cloud enable the "creation of both HEVC and AVC encoded renditions during transcoding." The Brightcove '388 Products perform video encoding incompliance with the HEVC standard as shown in the below excerpt from Brightcove documentation.



Yuriy Reznik, How to Efficiently Stream Multi-Codec Video, BRIGHTCOVE TECH-TALK BLOG, *available at*: https://www.brightcove.com/en/resources/blog/towards-efficient-multi-codec-streaming/ (last visited January 2025) (emphasis added).

352. The Brightcove ‘388 Products identify an initial quantization parameter employed to compress a previously decoded frame.

353. The Brightcove ‘388 Products, as part of the encoding process use an initial quantization parameter (QP) for encoding each frame or coding unit (CU). In conforming to the HEVC standard, the Brightcove ‘388 Products must set an initial QP value that serves as the baseline for encoding the decoded frame.

354. The Brightcove ‘388 Products calculate a delta quantization parameter as influenced by the initial quantization parameter, where the function is designed to yield this delta parameter at least in part to achieve a bitrate reduction while sustaining a given quality threshold.

355. The Brightcove ‘388 Products calculate a delta QP based on the initial quantization parameter. This function aims to minimize bitrate while retaining the required video quality.

356. The Brightcove ‘388 Products ascertain a subsequent quantization parameter for the purpose of compressing the decoded frame, based on both the initial and delta quantization parameters.

357. The Brightcove ‘388 Products determine a second quantization parameter using the initial QP and the delta QP. The Brightcove ‘388 Products calculate the second quantization parameter as QP1 + Delta QP. This second quantization parameter is the one used for encoding either the entire frame or specific coding units within the frame.

358. The Brightcove ‘388 Products compress the decoded frame utilizing the second quantization parameter.

359. The Brightcove ‘388 Products encode the video frames using the newly derived second quantization parameter.

360. By complying with the HEVC standard, the Brightcove '388 Products necessarily infringe the '388 Patent. Mandatory sections of the HEVC standard require the elements required by certain claims of the '388 Patent, including but not limited to claim 1. High Efficiency Video Coding, Series H: Audiovisual And Multimedia Systems: Infrastructure Of Audiovisual Services – Coding Of Moving Video Rec. ITU-T H.265 (August 2021). The following sections of the HEVC Standard are relevant to Brightcove's infringement of the '388 Patent: "7.3.2.2.3 Sequence parameter set screen content coding extension syntax;" "7.3.8.4 Coding quadtree syntax;" "7.3.8.14 Delta QP syntax;" "7.4.3.3.1 General picture parameter set RBSP semantics;" "7.4.7.1 General slice segment header semantics;" "7.4.9.14 Delta QP semantics;" "8.6.1 Derivation process for quantization parameters;" and "9.3.3.10 Binarization process for cu_qp_delta_abs."

361. All implementations of the HEVC standard necessarily infringe the '388 Patent as every implementation of the standard requires compliant devices to carry out the following: Each frame or coding unit (CU) is encoded using a pre-defined initial Quantization Parameter (QP) which serves as a baseline for various optimizations. The standard mandates that a first QP (QP1) be identified before any encoding can occur. The Brightcove '388 Products are, therefore, required to have mechanisms to set this initial QP1 for the to-be-encoded (or re-encoded) frame. Further, the HEVC standard sets out a structured way to adjust this initial QP based on a delta value. The objective of introducing a delta QP is generally to adapt to the complexity variations within a video sequence and to optimize rate-distortion performance. The HEVC encoding standard sets forth calculating a new QP (QP2) after determining the delta QP. This is done by adding the initial QP (QP1) and the delta QP. This step is essential for maintaining granular control over the rate-distortion tradeoff during encoding. Finally, the final encoding of the frame or CU takes place using QP2. The HEVC standard specifies that this is a requisite step for the encoding process to

be considered compliant. The Brightcove '388 Products must, therefore, encode frames using this newly computed QP2 to meet the standard's rate and quality stipulations.

362. Brightcove has directly infringed and continues to directly infringe the '388 Patent by, among other things, making, using, offering for sale, and/or selling technology for video compression using adaptive re-quantization using extracted and derived quantization parameters, including but not limited to the Brightcove '388 Products.

363. The Brightcove '388 Products are available to businesses and individuals throughout the United States.

364. The Brightcove '388 Products are provided to businesses and individuals located in this District.

365. By making, using, testing, offering for sale, and/or selling products and services comprising technology for video compression using adaptive re-quantization using extracted and derived quantization parameters, including but not limited to the Brightcove '388 Products, Brightcove has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '388 Patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

366. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the '388 Patent.

367. As a result of Brightcove's infringement of the '388 Patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Brightcove's infringement, but in no event less than a reasonable royalty for the use made of the invention by Brightcove together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff OptiMorphix, Inc. respectfully requests that this Court enter:

A. A judgment in favor of Plaintiff that Brightcove has infringed, either literally and/or under the doctrine of equivalents, the '664, '061, '285, '904, '105, '551, '141, '665, '361, '713, '169, and '388 Patents;

B. An award of damages resulting from Brightcove's acts of infringement in accordance with 35 U.S.C. § 284;

C. A judgment and order finding that Brightcove's infringement of the '664, '061, '285, '904, '105, '551, '141, '665, '361, '713, and '169 Patents after the date of service of the Original Complaint in the above-captioned action was willful, wanton, malicious, bad-faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate within the meaning of 35 U.S.C. § 284 and awarding to Plaintiff enhanced damages;

D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff reasonable attorneys' fees against Brightcove;

E. Any and all other relief to which Plaintiff may show themselves to be entitled.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiff OptiMorphix, Inc. requests a trial by jury of any issues so triable by right.

Dated: January 23, 2025

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