IN THE UNITED STATES DISTRICT COURT
DISTRICT OF DELAWARE

OPTIMORPHIX, INC., ***Plaintiff,*** v. **BRIGHTCOVE INC. AND BRIGHTCOVE HOLDINGS, INC.,** ***Defendants.***	**Civil Action No._____** **JURY TRIAL DEMANDED**

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"); and 8,429,169 (the "'169 Patent") (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]

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 Project*, BUSINESS WIRE (July 8, 2009) ("A Bytemobile customer since 2004, CMCC has deployed its web optimization solutions"); *Bytemobile Juices Up Orange*, ESPICOM TELECOMMUNICATION

[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).

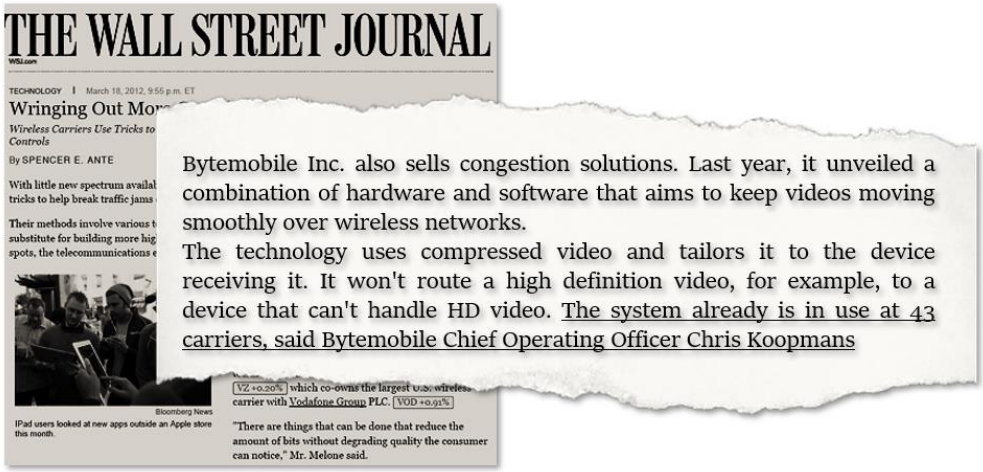
NEWS (October 10, 2002) ("Orange customers will experience faster application performance and Web page downloads"); *ByteMobile Wins 2013 LTE Award for Best LTE Traffic Management Product*, MARKETSCREENER (July 1, 2013) ("ByteMobile technology has been deployed . . . in networks serving nearly two billion 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.

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 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]

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

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.

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 (the "'664 Patent") 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 (the "'061 Patent") 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 (the “‘285 Patent”) 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 (the "'904 Patent") 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 (the "'105 Patent") 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 (the "'551 Patent") 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 (the "'141 Patent") 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 (the "'665 Patent") 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 (the "'361 Patent") 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 (the "'713 Patent") 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 (the "'169 Patent") 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

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

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

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

100. 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)").

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

102. The Brightcove '664 Products accept and/or gather media data, which comprises both elements of audio and video information.

103. The Brightcove '664 Products perform the step of receiving media data that includes both audio media data and video media data. In this stage of the method, the computer system ingests or collects media data, which might come from various sources like a live broadcast, stored files, or a streaming service. The data is then parsed or separated into audio and video components for further processing,

104. The Brightcove '664 Products take in an ideal session bitrate, which is the preferred data transfer rate for the media session.

105. The Brightcove '664 Products perform the step of receiving an optimal session bitrate. This step entails obtaining a pre-calculated or pre-defined bitrate that is considered optimal for the media session. This optimal bitrate is a crucial parameter that affects the quality and efficiency of both audio and video transmission.

106. The Brightcove '664 Products distribute the received ideal session bitrate between the audio and video media data, resulting in an optimal audio bitrate and an optimal video bitrate.

107. The Brightcove '664 Products perform the step of allocating the optimal session bitrate between the audio media data and the video media data to produce an optimal audio bitrate and an optimal video bitrate. In this process, the total available optimal session bitrate is divided into two portions, aligning with the requirements for audio and video quality.

108. The Brightcove '664 Products transform the audio media data using the determined optimal audio bitrate through a process of encoding.

109. The Brightcove '664 Products perform the step of encoding the audio media data using the optimal audio bitrate. This process involves compressing the raw audio data according to a specific encoding algorithm while adhering to the predetermined optimal audio bitrate.

110. The Brightcove '664 Products transmit the video media data with the use of the optimal video bitrate through encoding.

111. The Brightcove '664 Products perform the step of encoding the video media data using the optimal video bitrate. Similar to audio encoding, this step involves compressing raw video data into a specific format using the allocated optimal video bitrate.

112. The Brightcove '664 Products make the encoded audio media data and the encoded video media data available for dispatch to a terminal.

113. The Brightcove '664 Products perform the step of providing the encoded audio media data and the encoded video media data for transmittal to a terminal. This final step involves packaging the encoded audio and video data into a suitable transmission format and sending it to the receiving terminal, such as a user's device or a downstream processing system. The process may involve using specific transmission protocols and considering network conditions, latency requirements, and compatibility with the receiving device.

114. 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.

115. The Brightcove ‘664 Products are available to businesses and individuals throughout the United States.

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

117. 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 9 pursuant to 35 U.S.C. § 271(a).

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

119. 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

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

121. 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.

122. 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)").

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

124. The Brightcove '061 Products ingest media content comprising both audio and video streams.

125. The Brightcove ‘061 Products parse incoming media packets to separate the multiplexed audio and video elementary streams. This parsing is performed by a demultiplexer that identifies payload type identifiers (PTI) within the received Transport Stream (TS) or Real-time Transport Protocol (RTP) packets.

126. The Brightcove '061 Products collect a receiver report issued by a client device.

127. Upon session initialization or during an active streaming session, the Brightcove '061 Products receive Receiver Reports (RR) from the terminal. These reports received by the Brightcove ‘061 Products include metrics such as packet loss rate, round-trip time, jitter, etc.

128. The Brightcove '061 Products calculate the status of various network metrics based on the received receiver report.

129. The Brightcove '061 Products ascertain the best session bitrate through the derived network conditions.

130. Various network Quality of Service (QoS) metrics are calculated by the Brightcove '061 Products using the receiver report. Algorithms are employed by the Brightcove '061 Products to estimate network conditions, which include not only the current state but also predictive analytics for short-term future states.

131. The Brightcove '061 Products divide the determined optimal session bitrate into distinct audio and video bitrates.

132. The Brightcove '061 Products process the audio media content at the allocated optimal audio bitrate.

133. Based on these network condition estimations, bitrate adaptation algorithms, such as the Dynamic Adaptive Streaming over HTTP standard algorithms, are employed to determine the optimal session bitrate by the Brightcove '061 Products.

134. Further, once the session's optimal bitrate is determined by the Brightcove '061 Products, a further partitioning algorithm allocates the available bitrate between the audio and video streams.

135. The audio stream undergoes encoding by the Brightcove '061 Products that leverages codec algorithms to operate at the allocated optimal audio bitrate. This often involves the usage of Variable Bit Rate (VBR) encoding to adapt to the intricacies of the audio signal, keeping computational complexity and latency within acceptable bounds.

136. The Brightcove '061 Products process the video media content in accordance with the optimal video bitrate.

137. The Brightcove '061 Products dispatch the bitrate-optimized audio and video media data for delivery to the client terminal.

138. For video, encoding algorithms are utilized by the Brightcove '061 Products. These codecs take the optimal video bitrate and other encoder settings such as Group of Pictures (GOP) size and Quantization Parameters (QP) to produce a stream.

139. After the Brightcove '061 Products encode the audio and video streams, they are multiplexed into a common transport container for an adaptive streaming protocol.

140. 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.

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

142. The Brightcove '061 Products are provided to businesses and individuals located in this District.

143. 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 12 pursuant to 35 U.S.C. § 271(a).

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

145. As a result of Brightcove's infringement of the '061 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 III
INFRINGEMENT OF U.S. PATENT NO. 7,987,285

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

147. 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.

148. 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)").

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

150. The Brightcove '285 Products obtain a best-suited session bitrate.

151. The Brightcove '285 Products initiate a session by leveraging an adaptive bitrate algorithm (e.g., Dynamic Adaptive Streaming over HTTP (DASH)), to fetch the optimal session bitrate. This involves network probing to converge to an optimal bitrate that maximizes Quality of Experience (QoE) while minimizing re-buffering events and latency.

152. The Brightcove '285 Products allocate the optimal session bitrate among audio and video streams to yield ideal bitrates for both, with the allocation partially based on giving precedence to either the audio or video data.

153. The Brightcove '285 Products partition the optimal session bitrate into audio and video components. This allocation is computed by accounting not only the intrinsic complexities of each media stream but also the current contextual priorities.

154. The Brightcove '285 Products compress the audio and video content in accordance with the derived optimal audio and video bitrates.

155. The Brightcove '285 Products use specialized codecs for each media type—including the AAC (Advanced Audio Codec) for audio and H.264/AVC for video. These codecs utilize entropy coding, quantization, and transform techniques to compress the raw audio and video streams according to the pre-determined optimal bitrates. The encoding process employs CABAC

(Context-Adaptive Binary Arithmetic Coding) for entropy coding and employing spatial and temporal prediction for further compression.

156. The Brightcove ‘285 Products deliver compressed audio and video information for transmission to an end device.

157. The Brightcove ‘285 Products encapsulate the encoded audio and video streams into a container format such as MPEG-4 Part 14 (.mp4) or Matroska (.mkv). This container is then chunked and packetized for delivery.

158. 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.

159. The Brightcove ‘285 Products are available to businesses and individuals throughout the United States.

160. The Brightcove ‘285 Products are provided to businesses and individuals located in this District.

161. 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).

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

163. 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

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

165. 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.

166. 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)").

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

168. The Brightcove '904 Products acquire the best-suited session bitrate guided by the feedback from a TCP acknowledgement.

169. The Brightcove '904 Products divide the acquired session bitrate between audio and video channels to yield ideal bitrates for both, where the division is partially based on giving a higher weight to either the audio or video stream.

170. The Brightcove '904 Products utilize specified codecs to compress audio and video streams in accordance with the determined optimal audio and video bitrates.

171. The Brightcove ‘904 Products combine the compressed audio and video streams through a multiplexing operation.

172. The Brightcove ‘904 Products prepare the multiplexed audio and video streams for forwarding to an end terminal.

173. The Brightcove ‘904 Products employ a closed-loop control mechanism, where TCP acknowledgements are parsed to obtain Round-Trip Time (RTT) and packet loss metrics. These metrics are fed into a rate adaptation algorithm to ascertain an optimal session bitrate that maximizes throughput while minimizing latency.

174. The Brightcove ‘904 Products apply a bitrate allocation mechanism subject to the constraint of the optimal session bitrate. The allocation is adaptive to contextual elements to privilege either the audio or video stream.

175. The Brightcove ‘904 Products leverage codecs, such as ACC for audio and H.265/HEVC for video, that employ Vector Quantization, Discrete Cosine Transform (DCT), and motion compensation. The codecs used by the Brightcove ‘904 Products are optimized for the allocated optimal bitrates.

176. The Brightcove ‘904 Products utilize Time Division Multiplexing (TDM) and/or Statistical Time Division Multiplexing (STDM) to interleave the encoded audio and video streams. Data packets are annotated by the Brightcove ‘904 Products with appropriate headers and timestamps to facilitate downstream de-multiplexing.

177. The Brightcove ‘904 Products encapsulate the multiplexed audio and video streams into a transport stream.

178. 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.

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

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

181. 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).

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

183. As a result of Brightcove's infringement of the '904 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 V
INFRINGEMENT OF U.S. PATENT NO. 8,230,105

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

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

186. 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)").

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

188. The Brightcove '105 Products obtain an optimal session bitrate for media streaming.

189. The Brightcove '105 Products receive an optimal session bitrate. Specifically, this determination is based on one or more factors including network conditions, available bandwidth, and device capabilities.

190. The Brightcove '105 Products divide this optimal session bitrate between audio and video data to yield the best-suited bitrates for each.

191. The Brightcove '105 Products allocate the optimal session bitrate between audio and video media data to produce an optimal audio bitrate and an optimal video bitrate, wherein allocating the optimal session bitrate between audio and video media data is 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.

192. In accordance with MPEG-DASH standard, the Brightcove '105 Products are responsible for calculating or receiving an optimal session bitrate based on network conditions and/or the client's capabilities.

193. The Brightcove ‘105 Products base the bitrate allocation on criteria chosen from a set that includes pre-defined ratios, user settings, performance metrics, prioritizing one media type over the other, and the volume of audio and video data to be delivered.

194. The bitrate allocation used by the Brightcove ‘105 Products is 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.

195. The Brightcove ‘105 Products compress the audio and video content as per the determined optimal audio and video bitrates.

196. The Brightcove ‘105 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate.

197. The Brightcove ‘105 Products make available the compressed audio and video streams for forwarding to an end device.

198. The Brightcove ‘105 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate. This is achieved through utilizing encoding algorithms that are tailored to the bitrates allocated for each type of media. By compressing the media data according to these specific bitrates, the system ensures that the audio and video streams are packaged in a way that maximizes quality while adhering to the bandwidth limitations.

199. 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.

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

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

202. 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).

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

204. As a result of Brightcove’s infringement of the ‘105 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 VI
INFRINGEMENT OF U.S. PATENT NO. 8,255,551

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

206. 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.

207. 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)").

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

209. The Brightcove '551 Products receive an optimal session bitrate through data received from TCP acknowledgments.

210. The Brightcove '551 Products distribute the ideal session bitrate between audio and video streams, prioritizing either audio or video to achieve their respective optimal bitrates.

211. The Brightcove '551 Products process both audio and video streams using their determined optimal bitrates for encoding.

212. The Brightcove '551 Products combine the encoded audio and video streams into a single data stream.

213. The Brightcove '551 Products deliver the combined audio and video data stream for transmission to a terminal device.

214. 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.

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

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

217. 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).

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

219. As a result of Brightcove's infringement of the '551 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 VII
INFRINGEMENT OF U.S. PATENT NO. 8,769,141

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

221. 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.

222. 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)").

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

224. The Brightcove '141 Products receive both audio and video data.

225. The Brightcove '141 Products receive media streams, which include both audio and video data. Specifically, the Brightcove '141 Products use a manifest and segment retrieval process based on the products implementation of MPEG-DASH.

226. The Brightcove '141 Products obtain an optimal session bitrate.

227. The Brightcove '141 Products employ an ABR algorithm to determine an optimal session bitrate. Specifically, the Brightcove '141 Products implement MPEG-DASH and an optimal session bitrate is on metadata, like bitrates and resolutions of available segments, that are used to determine the optimal session bitrate.

228. The Brightcove '141 Products apportion the recommended session bitrate among audio and video streams, favoring either audio or video for a higher bitrate as needed.

229. The Brightcove '141 Products partition the optimal session bitrate between audio and video components. Specifically, through incorporation of MPEG-DASH adaptive bitrate management, the Brightcove '141 Products utilize a manifest that contains information on the available bitrates for both audio and video, enabling the allocation of bitrates between the audio and video data.

230. The Brightcove '141 Products compress the audio stream according to its optimal bitrate.

231. The Brightcove '141 Products compress the video stream using its designated optimal bitrate.

232. The Brightcove '141 Products multiplex the compressed audio and video data.

233. The Brightcove ‘141 Products prepare the multiplexed audio and video data for dispatch to a terminal device.

234. 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.

235. The Brightcove ‘141 Products are available to businesses and individuals throughout the United States.

236. The Brightcove ‘141 Products are provided to businesses and individuals located in this District.

237. 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).

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

239. As a result of Brightcove’s infringement of the ‘141 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 VIII
INFRINGEMENT OF U.S. PATENT NO. 8,775,665

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

241. 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.

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

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

244. The Brightcove '665 Products acquire segmented media through progressive download, which is initiated by a mobile device's media player and encompasses an initial and subsequent segment of multiple media frames.

245. The Brightcove '665 Products extract temporal metadata from the progressively downloaded media, where each media frame in the series is tagged with a time marker indicating when it should be displayed on the media player.

246. The Brightcove '665 Products ascertain the playback speed on the media player using the time markers attached to each frame in the series of media frames.

247. The Brightcove '665 Products organize the initial segment of media frames in accordance with the calculated playback velocity.

248. The Brightcove '665 Products devise a delivery timetable for the organized, progressively downloaded media, based on its frame arrangement.

249. The Brightcove '665 Products convey the arranged, progressively downloaded media to the media player per the previously established timetable.

250. 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.

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

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

253. 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).

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

255. As a result of Brightcove's infringement of the '665 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 IX
INFRINGEMENT OF U.S. PATENT NO. 9,894,361

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

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

258. Brightcove designs, makes, sells, offers to sell, imports, and/or uses the following products: Brightcove Zencoder and Brightcove Video Cloud (collectively, the "Brightcove '361 Product(s)").

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

260. The Brightcove '361 Products unpack a compressed video frame from a series containing multiple video frames.

261. 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.

262. 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.

263. 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.

264. The Brightcove '361 Products calculate a delta QP influenced by the initial QP.

265. 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.).

266. 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.

267. 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.

268. 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.

269. 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.

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

271. 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.

272. 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.

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

274. The Brightcove '361 Products are provided to businesses and individuals located in this District.

275. 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).

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

277. As a result of Brightcove's infringement of the '361 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 X
INFRINGEMENT OF U.S. PATENT NO. 9,749,713

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

279. 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.

280. 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)").

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

282. The Brightcove '713 Products receive encoded streaming media frames along with a frame index detailing original frame sizes and byte offsets, sourced from a data network.

283. The Brightcove '713 Products calculate a frame budget for an impending output media frame and formulating an output frame index, derived from original frame sizes in the provided frame index.

284. The Brightcove '713 Products generate an output media frame in real-time, employing an initial set of processing parameters.

285. The Brightcove '713 Products append padding to the media frame if the computed frame budget exceeds the dimensions of the resulting media frame.

286. In cases where the established frame budget falls short of the processed media frame's dimensions, the Brightcove '713 Products recalibrate the processing parameters using both the initial parameters and the frame budget, followed by reprocessing and, if the new frame still falls below the budget, appending padding.

287. The Brightcove '713 Products dispatch the finished output media frame.

288. 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.

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

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

291. 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).

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

293. As a result of Brightcove's infringement of the '713 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 XI
INFRINGEMENT OF U.S. PATENT NO. 8,429,169

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

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

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

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

298. The Brightcove '169 Products receive a request for content from a device connected to the Internet. Specifically, when a user makes a request to the Brightcove '169 Products, an HTTP request is sent over the Internet. This HTTP request is received by the Brightcove '169 Products, which are listening for incoming connections on the specific IP address and port number assigned (usually port 80 for HTTP and 443 for HTTPS). The request includes details such as the requested URL, HTTP method (e.g., GET, POST), headers, and any additional data.

299. The Brightcove '169 Products query a web server for a specific segment of content related to the user's content request. Once the Brightcove '169 Products have received and parsed the request, the Brightcove '169 Products determine how to handle the request based on its configuration rules. If the requested content is not available in the Brightcove '169 Products' caches, the Brightcove '169 Products may act as a reverse proxy and forward the request to the appropriate origin server. The web server processes this request and returns the requested content back to the Brightcove '169 Products.

300. The Brightcove '169 Products identify one or more descriptors for the content corresponding to the user's request, where these descriptors include the particular content segment associated with the initial request.

301. The Brightcove ‘169 Products compute an index related to the requested content by applying the identified descriptors to a hashing function, wherein this computed index aids in locating a corresponding entry in a cache data structure by matching against indices tied to existing entries.

302. The Brightcove ‘169 Products, acting as a reverse proxy, receive a request and processes it according to the rules defined in the Brightcove ‘169 Products’ configuration files. The Brightcove ‘169 Products use the HTTP protocol to communicate with client devices and web servers. When a request is received, the Brightcove ‘169 Products extract the request line, headers, and body from the request packet. The request line contains the request method (such as GET, POST, PUT, or DELETE), the request URL, and any query string or fragment identifier. The headers contain metadata about the request, such as the client's IP address, browser type, and any authentication credentials. The body contains the data sent with the request, such as form data or file uploads.

303. The Brightcove ‘169 Products then use the request line and headers to determine how to process the request. For example, if the request method is GET, the Brightcove ‘169 Products will retrieve the requested content from a web server and return it to the client. If the request method is POST, the Brightcove ‘169 Products will pass the request body to a web server for processing and return the server's response to the client. Characterization data includes data such as URL, Content-Type, ETag, Last-Modified date, etc. When the Brightcove ‘169 Products receive content from the origin server, it also receives headers that contain this metadata. This metadata can be used to characterize the content for caching purposes.

304. When storing a response in the cache, the Brightcove '169 Products generate a key using a hash function. The key can be modified using the proxy_cache_key directive. This key is used to store and retrieve the cached content efficiently.

305. Once the Brightcove '169 Products have determined that it needs to retrieve content from a web server, the Brightcove '169 Products send a request to the server using the HTTP protocol. The request includes the request line, headers, and any data from the client's request that needs to be passed to the server. The Brightcove '169 Products can be configured to use different algorithms to choose the web server that will receive the request. For example, the Brightcove '169 Products can use a round-robin algorithm to distribute requests across multiple servers, or the Brightcove '169 Products can use a least-connections algorithm to send requests to the server with the fewest active connections.

306. Once the request is sent to the web server, the Brightcove '169 Products wait for the server's response. The response includes a status line, headers, and a body containing the requested content. The Brightcove '169 Products then extract the content from the response body and store it in a cache.

307. The Brightcove '169 Products process the content to identify characterization data that can be used to cache the content. The characterization data is a compact representation of the content that allows the Brightcove '169 Products to quickly determine whether it has a cached copy of the content that is identical to the requested content. The Brightcove '169 Products can use various algorithms to generate characterization data, such as a checksum, a hash function, or a compression algorithm. For example, a checksum can be used for small pieces of data, while a hash function can be used for larger pieces of data. The characterization data is then stored in the

Brightcove '169 Products cache, along with the content, so that it can be quickly retrieved when a subsequent request for the same content is received.

308. 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.

309. The Brightcove '169 Products use a hash function to generate an index that corresponds to the content. The hash function takes the characterization data as input and generates a unique output that can be used to identify the content in the Brightcove '169 Products' cache. The hash function used by the Brightcove '169 Products can be a simple hash function, such as the Jenkins hash function, or a more complex hash function, such as the SHA-256 hash function.

310. 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.

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

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

313. 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).

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

315. As a result of Brightcove's infringement of the '169 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.

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, and '169 Patents;

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

C. 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: October 11, 2024

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