IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Aylo Freesites Ltd.,
Petitioner

v.

DISH Technologies L.L.C.,
Patent Owner.

IPR2024-00146; -0043; -0044; -0045; -0046
Attorney Docket No.: 081841.0167

DECLARATION OF ROBERT DREW MAJOR IN SUPPORT OF DISH TECHNOLOGIES L.L.C.'S PATENT OWNER RESPONSE TO PETITIONER'S PETITIONS FOR *INTER PARTES* REVIEW

I, R. Drew Major, declare as follows:

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters stated herein.

2. My compensation is not based on the content of my opinions or the resolution of this matter.

3. This declaration is about the Adaptive-Bitrate Streaming Patents that concern the streaming of video content over the Internet, referred to as the ABR Patents. The ABR Patents include US. Patent Nos. 10,469,555, 11,430,138, 10,469,554, 10,951,680, 11,677,798, 9,407,564, 8,868,772, and 10,757,156, as well as many others.

4. I am one of the inventors of the ABR Patents. This declaration is also about MOVE Networks, Inc. ("MOVE" or "MOVE Networks") and the successful adaptive-bitrate streaming products and systems we developed at MOVE Networks that utilized the ABR Patents.

5. I founded MOVE Networks (known as XLon Technologies, LLC until 2006). Our mission was to make video available over the Internet that you would normally watch via cable TV, satellite, or using TV antennas, as well as by using video tapes or DVDs.

6. Because of my inventions, which include those disclosed in the ABR Patents, I have been inducted into the Utah Valley Entrepreneurial Forum Hall of

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 2
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

Fame (EX2068) and the Utah Technology Council Hall of Fame (EX2069). For previous work I did at Novell, I was inducted into the National Computer Industry Hall of Fame in 1999.

7. Before my inventions disclosed in the ABR Patents, the state of the art for video delivery over the Internet were based on proprietary implementations of standard video streaming protocols like RTP/RTSP. These protocols were implemented using expensive specialized servers. Techniques like video downloading or progressive downloading were also used. Streaming of recorded or especially live video using any of these methods did not work well because they did not dynamically adapt quickly to varying Internet bandwidth speeds and often had issues with Internet firewalls. Or in the case of video downloading, they required that the viewer choose the video quality then wait until the entire video was downloaded before it could be played. There was a great need for a system that could consistently deliver high quality video on demand and live video.

8. Video delivery systems in the early 2000s were often unable to reliably deliver video over the Internet in a way that took into account all of the different network conditions and congestion that different users would experience based on their different Internet connections. The state-of-the-art approaches that the industry took at that time required expensive specialized servers yet often were inadequate in

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 3
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

delivering video to all of these different users in a way that could adapt to each user's individual video device and Internet connection available bandwidth.

9. In the 2003 time frame, options for accessing video content online were limited. They either involved waiting for the content to entirely or partially download (which could not support viewing live content) or streaming content in a way that often was unreliable because it would pause or freeze to buffer or work at a low-resolution. While at the same time, the Internet was fast becoming a preferred method of distributing content, including video, despite the unreliability and expense of content delivery over the Internet. Most commercial video streaming systems from companies like Microsoft or Apple were proprietary implementations that were mutually incompatible with one another and expensive to deploy because they used specialized servers that supported only a small number of concurrent viewers.

10. In order to overcome the problems present in the industry at that time I, along with my co-inventors Mark Hurst and David Brueck, invented a technology called HTTP Adaptive Bitrate Streaming to deliver television and other video content over the Internet for networks, which included BYU.tv and ESPN. Today this technology is used by Sling TV as well as other services like Paramount+, Univision, and other companies to make live and recorded video content available over the Internet.

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 4
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

11. The ABR Patents and our invention solved these problems by providing an entirely new way of delivering video over the Internet that involved creating video streamlets that were short in length and separately compressed and encoded at different quality levels, since different quality levels have different sizes and require different amounts of Internet bandwidth to be successfully delivered on time. The client playback device is in control of switching between the different quality streamlets, with any changes done in real time as the actual current internet bandwidth available to the client is measured and any needed adjustments made every 2 seconds. This enables smooth, non-interrupted viewing at the highest possible quality level as well as almost instantaneous viewing startup by initially requesting low-quality streamlets before upshifting, if possible, to higher quality streamlets. All of these capabilities used the standard web servers, standard Content Delivery Networks (CDN)s, and standard Internet protocols like HTTP. The use of standard HTTP GET requests also allowed for concurrent delivery of different parts of the video, which largely overcomes inherent aggressive bandwidth throttling due to network congestion. The use of standard CDNs also enabled scaling to a massive number of users at the lowest cost because it did not require specialized servers to keep track of the status of the user's stream or make determinations about which stream quality to deliver.

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 5
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

12. HTTP Adaptive Bitrate Streaming covered by the ABR Patents is also superior when looking at how it implements streaming of live TV. Specifically, it changed the live video feed into a sequence of segments so each segment could be encoded and compressed on the fly into various bit rates. It also enables better video compression since multiple servers could be used for parallel encoding of different segments. This allowed for more intensive compression processing than what can normally be done on live video since now the compression could take longer than the time length of the video segment and use techniques such as multi-pass encoding.

13. Notably, none of the other live stream compressing systems did this at that time. Other approaches at the time required using expensive specialized video servers. Moreover, the state-of-the-art live video delivery systems of the time often tried to send data using UDP packets over the Internet but often these could not get through firewalls so these systems had to then switch to using suboptimal TCP, which resulted in reliability and latency issues such as slower startup times.

14. But with this HTTP Adaptive Bitrate Streaming technology, the video segments could be delivered using standard Internet CDNs using HTTP requests. So, using this approach with live TV resulted in higher quality video, faster start times, more dynamic adjusting to Internet bandwidth variations without hiccups, and was significantly less expensive to operate. The technology of the ABR Patents was

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 6
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

ultimately the key enabler of live and video on demand streaming over the Internet today.

15. The inventions of the ABR Patents concern producing streamlets of different bitrates for the same video with an intelligent client that selects the streamlet that is appropriate given the available bandwidth and capability of the device.

16. The invention for example created multiple different copies of the same video with the copies having different quality levels and segmented each copy to provide short (e.g., 2-second) encoded streamlets. Since the encoded streamlets across the different copies of the video were of the exact same length, a time index could be created for the entire length of the video. This approach enabled the system content to "adapt" to the Internet bandwidth and congestion at any particular time, by allowing the end user's device to select the file size that suits the current bandwidth available. If the Internet bandwidth is congested, the end user's device "adapts" to request smaller sized streamlets so that the viewer program continues rather than freezing up or buffering. If bandwidth opens up, the end user's device requests larger sized streamlets with higher resolution and quality. It puts the end user's device in control to pull the appropriately sized content in real time at the highest possible quality seamlessly.

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 7
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

17. As I mentioned above, we viewed this as an entirely new way of delivering video over the Internet that involved creating small, individually encoded streamlets of different qualities, such as high, medium and low quality streamlets from the original video content file, which are aligned by starting time and substantially the same duration (typically 2 seconds), and switching between the different quality streamlets. The contiguous playback in the time indexed order of the streamlets independently yields seamless playback of the full content, that is, without freezing up or intermittently stopping the stream to buffer. All of this is controlled by the client device and enables the use of standard and much cheaper web servers and standard Internet protocols like HTTP. This also allows for almost immediate video playback starts (when at the start the actual network bandwidth may not be known) by first requesting smaller low-quality streamlets and then determining whether to shift to higher quality streamlets as the bandwidth becomes known.

18. In 2010, EchoStar (now merged with DISH), purchased MOVE Networks for $45 Million. EchoStar used our technology from MOVE Networks to develop a streaming platform to process and distribute video. The platform is now used for the Sling TV video streaming service. The streaming service was launched as Sling TV in 2015 as the nation's first paid, packaged live television streaming service provided over the Internet. With Sling TV, users stream over the Internet

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 8
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

many of the channels that previously required purchasing through a cable or satellite TV.

19. Using the technology of the ABR Patents, Sling TV and DISH provide both live TV and video-on-demand. In fact, my technology works almost exactly the same way regardless of whether it is used for live TV or video on demand.

20. Sling TV grew to over two million subscribers based on its adoption of the inventive technology. DISH also received industry recognition for Sling TV's contribution to Internet video streaming.

21. For example, Sling TV, which utilizes the inventions in the ABR Patents, was awarded a Technology & Engineering Emmy Award by the National Academy of Television Arts and Sciences for its groundbreaking work recognizing "excellence in engineering" for Sling TV. EX2013. The Emmy Award for "technology or engineering represents acknowledgement of engineering development that considerably improves existing technology" EX2013. Below is a picture of the Emmy award and an article that discuss the award of the Emmy from January 2000. EX2013.

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 9
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

2018-2019 Technology & Engineering Emmy® Award — recognizing development that "considerably improves existing technology"—related to its adaptive bitrate streaming technology

EX2013 (Emmy Article) at 2.

22. Further details on the history of MOVE Networks are also relevant here. Within a couple years after our product release in Fall of 2006, MOVE Networks had about 35 million people download the MOVE Networks client in order to use our HTTP Adaptive Bitrate streaming technology. Most of the downloads were for viewing ABC and Disney programming.

23. One of our early tests including streaming the bi-annual conference for the Church of Jesus Christ of Latter-Day Saints in October 2005. We worked with Brigham Young University Television, BYU.tv, to stream the conference live over the Internet. Tens of thousands of people watched the conference live. As a result, we proved our technology worked and no one was doing anything of this kind at the time. EX2051.

24. The industry reaction was overwhelmingly positive for our invention – from industry people calling Move "an excellent technology partner" with technology "superior to others" to others explaining their surprise after our demonstrations defeated their skepticism. EX2042; EX2043. For example, we showed our technology to Disney, which was so impressed that it used MOVE Networks to deliver all of its ABC HD programming in 2007 over the Internet. *E.g.*, EX2040. This included popular shows like Grey's Anatomy, Survivor, Lost, and many others. *See, e.g.*, EX2041.

25. In 2008, we collaborated with Microsoft to support streaming of the Democratic National Convention, with support from Level 3, and earned praise from the industry and Microsoft. A document was published by Microsoft and is a question and answer session between Scott Guthrie, the then-Corporate Vice President of the Developer Division at Microsoft and Microsoft's own PressPass. The session discussed the successful collaboration between MOVE Networks and Microsoft for the 2008 Democratic National Convention. EX2060; EX2031-2033.

26. As shown in EX2060, Microsoft and Scott Guthrie went so far as to say that the "live, online webcast of the Democratic National Convention was the first large demonstration of the integration of MOVE Networks and Silverlight" and "was a technological success and tremendously popular." Guthrie noted that "visitors to the official convention Web site view[ed] more than 350,000 hours of video" and

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 11
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

"experience[d] the convention online like never before." He also reported it was the "highest-quality video experience they have ever seen online." *Id*.

27. In EX2060, Guthrie also explained how Microsoft took an equity stake in MOVE Networks betting on its groundbreaking HTTP Adaptive Bitrate Streaming technology. Guthrie specified that MOVE Networks was "a leader in HTTP-based video delivery" and that "Move has developed an adaptive streaming technology that seamlessly adjusts image quality to fit available bandwidth on each viewer's Internet connection, creating a high-quality Internet television viewing experience." *Id.*

28. By September 2010, MOVE Network's customers also included Oprah Book Club, Televisa, CW, Comcast, ProSieben, and BYU.tv. EX2014 (MOVE Networks Awarded Fundamental Patent on Adaptive Video Streaming).

29. Others also saw the benefits of using our patented technology. MOVE Networks received investments from Walt Disney, Hummer Winblad Venture Partners, Benchmark Capital Partners, Level 3, Microsoft, Cisco, Comercio Mas, and Comcast totaling over $50 million in funding based on the strength of our patented technology. EX2048; EX2058.

30. Ultimately, this adaptive bit-rate streaming solution has been standardized within MPEG-DASH and by Apple within HTTP Live Streaming, or HLS. Most of the industry that streams live or on-demand content uses this HTTP

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 12
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

Adaptive bit-rate streaming solution claimed in our patents. And this technology has also led to millions of subscribers leaving their traditional cable and satellite providers like DISH by "cord-cutting," and then subscribing to some Internet-based streaming platforms, like Sling TV, that use our patented technology.

31. Notably, MOVE Networks entered into a non-disclosure agreement with Apple late 2006, pursuant to which MOVE Networks revealed novel elements of its Adaptive Bitrate Streaming Technology to Apple. EX2055. After explaining to Apple how it could support our invention in 2007, to our surprise, in 2009, Apple proposed a standard they called HLS, short for HTTP Live Streaming, which looked essentially the same as what we had done. Apple eventually replaced their existing QuickTime streaming approach with HLS.

32. HLS is an adaptive bitrate streaming protocol that is heavily inspired by MOVE Networks's HTTP Adaptive Bitrate Streaming technology. Like MOVE Networks's technology and the technology embodied in the claims of the ABR Patents, Apple's HLS protocol supports live and on-demand streaming video content, it has short streamlets compressed at various sizes and allows the end user device to decide which size streamlet to download. The end user device does this by making a HTTP GET request. The servers are standard data servers that do not monitor the Internet connection, the end user's device does that. Indeed, Akamai, Adobe, Limelight, Microsoft, Paramount+, Univision, Peloton, iFit, lululemon,

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 13
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

Bowflex and others all use Adaptive Bitrate Streaming technology that was inspired by MOVE Network's invention.

33. Nevertheless, the industry's recognition was not limited to copying. Many wrote articles, such as one praising the quality as "shockingly good." EX2022. That particular article mentioned modern cord-cutting, explaining that with MOVE Networks's technology, "someday you'll be able to ditch your cable or satellite provider and get your content from cheaper sources that also happen to be legal." *Id.*

34. Further, MOVE Networks received many awards and accolades for its groundbreaking advances in streaming video. MOVE Networks received awards, including OnHollywood 100 Winner, OnMedia 100 Winner, Red Herring 100 Winner, Red Herring Global 100 Winner, and a TechCrunch Crunchies Award Finalist. EX2016; EX2017; EX2018; EX2019; EX2020.

35. The most significant recognition of all, however, is that almost all video streaming that happens over the Internet today for live or on-demand content is based on the HTTP Adaptive Bitrate approach that we invented. The then-current state-of-the-art approaches used by others have been pretty much abandoned.

36. In view of our groundbreaking inventions, MOVE's years of success, and my contributions to the industry, I was inducted into the Utah Valley Entrepreneurial Forum Hall of Fame in 2013 and the Utah Technology Hall of Fame in 2005. EX2068; EX2069. The article from the Utah Daily Herald at EX2015

DISH TECHNOLOGIES L.L.C., Exhibit 2010, p. 14
Aylo Freesites Ltd. v. Dish Technologies L.L.C., IPR2024-00046

references some of my accomplishments over the years and the success of MOVE Networks including the invention of HTTP Adaptive Bitrate Streaming.

37. All statements made herein of my own knowledge are true, and all statements made on information and belief are believed by me to be true. I further understand that willful false statements and the like are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I declare under penalty of perjury that the foregoing is true and correct.

Executed in American Fork, Utah on July 19, 2024

Robert Drew Major

R. Drew Major