UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FUBOTV MEDIA, INC. & YANKA INDUSTRIES, INC.,
Petitioners,

v.

DISH TECHNOLOGIES L.L.C.,
Patent Owner.

IPR2024-00917
IPR2024-00918
IPR2024-00919

AYLO FREESITES LTD,
Petitioner,

v.

DISH TECHNOLOGIES L.L.C.,
Patent Owner.

IPR2024-00940

Attorney Docket No.: 081841.0227

DECLARATION OF R. DREW MAJOR IN SUPPORT OF PATENT OWNER RESPONSE

I, R. Drew Major, hereby declare as follows:

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

2. I am the founder and initial funder of MOVE Networks, Inc. ("MOVE"), which was known previously as XLON Technologies, LLC. MOVE's mission was to make video available over the Internet that previously would have been available only via cable TV, satellite, video tapes, DVDs, or antenna-based TV systems.

3. I am a listed inventor on numerous U.S. Patents. Several of those patents claim inventions to adaptive bitrate ("ABR") streaming technology that my colleagues and I developed while at MOVE. Those patents include U.S. Patent Nos. 8,868,772; 9,407,564; 10,757,156; and 11,992,234 (for purposes of this declaration only, I refer to those patents collectively as the "ABR Patents").

4. Because of my inventions, which include those disclosed in the ABR Patents, I was inducted into the Utah Valley Entrepreneurial Forum Hall of Fame (EX2078) and the Utah Technology Council Hall of Fame (EX2079). In 1999, I was also inducted into the National Computer Industry Hall of Fame for work I previously did at Novell, Inc.

5. My compensation is not based on the resolution of these matters, I have no financial interest in the outcome of these matters, and the statements I make in this declaration are not influenced by any financial or compensatory motive.

6. Before my inventions disclosed in the ABR Patents, the state of the art for video delivery over the Internet was 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 (including High-Definition ("HD") video) in any of these methods did not work well because these methods did not dynamically adapt quickly to varying Internet bandwidth speeds and often had issues with Internet firewalls. Often, viewers wishing to view videos according to these methods experienced persistent interruptions (e.g., buffering), latency, or packet loss. Or in the case of video downloading, they required that the viewer choose their preferred video quality and then wait until the entire video was downloaded before it could be played. There was great need for a system that could consistently deliver a continuous stream of live or on-demand video with increased quality and reliability and with reduced latency and interruptions.

7. Video delivery systems in the early 2000s were often unable to reliably deliver video over the Internet that took into account all of the 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, which were often inadequate in delivering continuous video in sharp qualities to all these different users in manners that adapted to each user's individual video device, Internet connection, and available bandwidth.

8. Around 2003, options for accessing video content online were limited. As I mention above, these options involved waiting for the video content to entirely or partially download, which could not support viewing live content, or streaming content in a way that was often unreliable because the video stream would pause or freeze to buffer or work at low resolutions. At the same time, the Internet was fast becoming a preferred method of distributing content, including video, despite the unreliability and expense. As a result, most commercial video streaming systems from companies like Microsoft or Apple were proprietary implementations requiring specialized servers that were

mutually incompatible with one another, expensive to deploy, and supported only a small number of concurrent viewers.

9. In order to overcome the problems present in the industry at that time, my co-inventors (Mark Hurst and David Brueck) and I invented a technology called HTTP Adaptive Bitrate Streaming to deliver television and other video content over the Internet for networks. At first, our technology was used for networks such as BYU.tv, ABC.com, ESPN360, the CW, E! Online, Fox, and Televisa. *See, e.g.*, EX2031; EX2032; EX2035; EX2049. Today, this technology is used by Sling TV and other services, like Paramount+, Univision, Peloton, and other companies that make live and recorded video content available over the Internet.

10. The ABR Patents and our invention solved these problems by providing an entirely new way of delivering video content over the Internet. Exhibits 2021, 2022, 2069, and 2077 are internal documents that Move used to summarize these points and showcase its product. In particular, our invention created 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. EX2021; EX2022; EX2069; EX2077. In our invention, the client control device was in control of seamlessly switching between the different quality levels of streamlets, with any changes done in real time without interrupting playback of the content. EX2021; EX2022; EX2069; EX2077. Any changes to the quality levels were evaluated on the fly as the actual current Internet bandwidth available to the client was measured and any needed adjustments were made every few seconds. *See, e.g.*, EX2021; EX2022; EX2069; EX2077. This enabled smooth, uninterrupted viewing at the highest-possible resolution levels (including HD-quality levels); near-instantaneous viewing startup by initially requesting lower-quality streamlets before upshifting, if possible to higher quality

streamlets; and seamless shifts between quality levels of the video without interruptions in playback. *Cf.* EX2021; EX2022; EX2069; EX2077. And all of these capabilities were employed using standard web servers, standard Content Delivery Networks ("CDNs"), and standard Internet protocols, like HTTP. The use of standard HTTP GET requests also allowed for the 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 massive audiences of users at the lowest cost possible because this use did not require specialized servers to keep track of the status of the user's stream or to make determinations about which stream quality to deliver.

11. The HTTP Adaptive Bitrate Streaming invention covered by the ABR Patents is also superior when looking at how the invention implements the streaming of live HD video. EX2021; EX2022; EX2069; EX2077. Specifically, the invention changed the live video feed into a sequence of segments so that each segment could be encoded and compressed on the fly into the various quality levels, or bitrates. EX2021; EX2022; EX2069; EX2077. The invention also enables better compression since multiple standard servers could be used for the encoding of different segments. EX2021; EX2022; EX2069; EX2077. This allowed for more intensive compression than that would normally have been done with live video in the early 2000s since now the compression could take longer than the length of time of the video segment and use techniques such as multi-pass encoding without interrupting the playback of the video. EX2021; EX2022; EX2069; EX2077.

12. Notably, none of the other live stream compression systems had this technology or operated this way at that time. As I explained above, other commercially available approaches at that time required using expensive specialized video servers. Moreover, the state-of-the-art live video

delivery systems often tried to send data using User Datagram Protocol ("UDP") packets over the Internet, but often these packets could not pass through firewalls, requiring systems to switch to using sub-optimal Transmission Control Protocol ("TCP") connections that left users suffering from inferior reliability, greater latency, and much slower start-up times. Exhibit 2103 accurately reflects the state of the art streaming technologies prior to my invention.

13. But with this HTTP Adaptive Bitrate Streaming technology, the video segments could be delivered using standard Internet CDNs and HTTP requests and continuously displayed on end user stations. EX2021; EX2022; EX2069; EX2077. So, using this approach with live TV led to the consistent delivery of HD-caliber video, faster start times, more dynamic adjusting to Internet bandwidth variations without hiccups, and substantially lower operational costs. EX2021; EX2022; EX2069; EX2077; EX2122. The technology of the ABR Patents proved to be the key enabler of HD live and video on demand streaming over the Internet, and I find it no surprise that it is still the standard method of streaming over the Internet today. EX2064; EX2096.

14. As I mentioned above, we viewed the HTTP Adaptive Bitrate Streaming technology as an entirely new way of delivering video over the Internet. It involved creating small, individually encoded streamlets of different qualities, such as high, medium, and low-quality streamlets from the original video content file, which were aligned by starting time and substantially the same duration (typically two 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, the playback would occur without freezing up or intermittently stopping the playback 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. This also allowed 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.

15. In 2010 EchoStar (now merged with DISH), purchased MOVE for $45 Million. EchoStar used our technology from MOVE to develop a streaming platform to process and distribute video. The platform, which still practices the inventions disclosed in the ABR Patents, is now used for Sling TV. Sling TV was first launched 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 many of the channels that previously required purchasing through a cable or satellite TV. And not only do Sling TV users get to view these channels in HD, but they experience the same seamless switching between quality levels without buffering, stalling, or latency thanks to Sling TV's use of HTTP Adaptive Bitrate Streaming technology.

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

17. Sling TV grew to over two million subscribers based on its adoption of our inventive technology. In addition to MOVE's receiving voluminous press and industry recognition, Sling TV also received industry recognition for its contribution to Internet video streaming.

18. In fact, Sling TV was considered a "pioneer in adaptive bitrate streaming" and earned a Technology & Engineering Emmy® Award by the National Academy of Television Arts and Sciences for its groundbreaking work. EX2023. The Emmy® Award for "technology or engineering represents the acknowledgement of engineering development that considerably improves existing technology." EX2023. Below is a picture of the Emmy® Award from January 2020.

Further details on the history of MOVE are also relevant here. Within a couple of years after our product release in the Fall of 2006, MOVE had about 35 Million people download the MOVE client, a browser-based plug-in, in order to use our HTTP Adaptive Bitrate Streaming technology. Most of the early downloads were for viewers who claimed to be "shocked" at the "superior quality" of ABC.com's player.

19. One of MOVE's earliest tests included streaming the bi-annual conference for the Church of Jesus Christ of Latter-Day Saints in October 2005. We worked with Brigham Young University's ("BYU") television network, 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 that no one was doing anything of this kind at the time. EX2120; EX2064, at 1; EX2061.

20. The industry reaction was overwhelmingly positive for our invention—from industry people calling MOVE "an excellent technology partner" with technology "far superior to others" to others explaining their surprise after our demonstrations defeated their skepticism. EX2052;

2053. For example, we showed our technology to Disney, which was so impressed that it used MOVE to deliver all of its ABC.com programming over the Internet in HD in 2007. *E.g.*, EX2050. This included popular shows like Grey's Anatomy, Lost, Survivor, and many others. *See, e.g.*, EX2051.

21. In 2008, MOVE collaborated with Microsoft to support the streaming of the Democratic National Convention, with CDN support from Level 3, and received tremendous praise from viewers, the industry, and Microsoft. For example, one author wrote "[T]he most awesome (I probably have never used that word in seven years of this site) online video feed is on the official Democratic Convention site, on DemConvention.com site. It is in HD, and uses Move Networks' Plugin and using Microsoft Silverlight." EX2091. Another wrote "Move burnishes its reputation for high-quality video delivery gained through deals with ABC, Discovery, Fox, and others. These two are natural partners." *Id.*

22. As shown in EX2070, Microsoft and Scott Guthrie, Microsoft's then-Corporate Vice President of the Developer Division, went as far 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 that it was "a technological success and tremendously popular." EX2070. Guthrie noted that "visitors to the official convention website view[ed] more than 350,000 hours of video" and "experience[d] the convention online like never before." *Id.* He also reported that it was the "highest-quality video experience they have ever seen online." *Id.*

23. Following the successful Democratic National Convention, Microsoft invested in MOVE, joining other investors who also saw the tremendous upside potential of MOVE's patented technology. By September 2010, MOVE received investments from Steamboat Ventures (Disney's investment arm), Hummer Winblad Venture Partners, Benchmark Capital Partners,

Level 3, Microsoft, Cisco, Comercio Mas, and Comcast, totaling over $50 Million in funding. EX2044; EX2058; EX2068; EX2130. By September 2010, MOVE's customers also included Oprah's book Club, Televisa, Comcast, the CW, ProSieben, BYU.tv, Fox, and more. EX2024.

24. Ultimately, this HTTP Adaptive Bitrate Streaming technology has been standardized with within the MPEG-DASH and HTTP Live Streaming ("HLS") protocols. Most of the industry that streams live or on demand content uses this HTTP Adaptive Bitrate Streaming technology developed at MOVE and claimed in our patents. And this technology has 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, which use our patented technology.

25. HLS is an adaptive bitrate streaming protocol that is heavily inspired by MOVE's HTTP Adaptive Bitrate Streaming technology. Like MOVE'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, Bowflex and others all use Adaptive Bitrate Streaming technology that was inspired by MOVE Network's invention. EX2024; EX2062; EX2096.

26. Nevertheless, the industry's recognition was not limited to copying. Many wrote articles, such as one praising the quality as "shockingly good." EX2052. That particular article mentioned modern cord-cutting, explaining that with MOVE'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.*

27. 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. EX2026; EX2027; EX2028; EX2029; EX2030.

28. 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.

29. 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. EX2088; EX2089. The article from the Utah Daily Herald at EX2025 references some of my accomplishments over the years and the success of MOVE Networks including the invention of HTTP Adaptive Bitrate Streaming.

30. 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 February 26, 2025

Robert Drew Major

R. Drew Major