UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,
Petitioner

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

IPR2024-01141

U.S. Patent No. 8,036,273

DECLARATION OF DR. STEPHAN WENGER

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: July 2, 2024 By: _____

Dr. Stephan Wenger

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I. INTRODUCTION

1. My name is Dr. Stephan Wenger. I have been retained by Amazon.com, Inc. and Amazon.com Services LLC ("Petitioner") in connection with its petition for *inter partes* review ("IPR") of United States Patent No. 8,036,273 ("the '273 patent"). I am being compensated at my usual and customary rate of $400 per hour for the time I spend in connection with preparing this declaration. My compensation is not affected by the outcome of this or any other IPR.

2. I have been asked to provide information regarding the procedures for publishing documents, including "test models," related to meetings of Study Group 16 ("SG16"), Question 6, of the International Telecommunication Union-Telecommunication Sector ("ITU-T"), including H.26L Test Model Long Term Number 6 ("TML-6"). ITU-T SG16 Question 6 is also known as the Video Coding Experts Group ("VCEG"). I have further been asked about the availability of documents uploaded to FTP servers used by VCEG, and the distribution of documents of VCEG.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

3. I have been involved with the standardization of audiovisual and multimedia systems for over twenty-five years. I have frequently served as a chairperson of subgroups in VCEG and other video coding standards bodies, including during the 2001 timeframe.

4. In 1989 I received the German equivalent of a Master's degree from the Technische Universität Berlin. I then received the German equivalent of a Ph.D. in Computer Science from the Technische Universität Berlin in 1995. Both my Master's and Ph.D. theses relate to multimedia coding and communication.

5. Since 1994, I have served as a consultant for a variety of companies, including Creatix Polymedia GmbH, Siemens AG, Array Microsystems, Philips Multimedia Research Center, Intel Corp., Microsoft Corp., LG Electronics, Polycom Network Systems, Polycom Inc., and TeleSuite Inc., providing technical expertise related to video coding. For example, at Siemens AG, where I consulted between 1996 and 1997, I led the creation of an 80-page study on the H.263 and then forthcoming H.263+ standards for video conferencing applications.

6. During my time consulting for Microsoft Corp., between 1997 and 1999, I provided advice on standardization issues in the ITU-T, particularly on questions of video compression. As a consultant for Polycom Network Systems (Israel), between 1999 and 2004, I trained signal processing staff at the company on forthcoming video compression technologies, namely H.263+, H.263++, MPEG-4 advanced simple profile, and JVT/H.264. I also worked as a consultant for Polycom Inc, Video Group (USA), where I was involved in standardizing a certain video coding tool as part of ITU-T Recommendation H.264. Between 2002-2004, I

advised TeleSuite Inc. on the design of a new, high-end H.264 video conferencing endpoint.

7. In addition to the above consulting roles, between 1988 and 2024, I was employed by several companies and organizations such as Technische Universität Berlin, Teles AG, Teles Communications Corp., Vidyo, and Tencent America LLC. During my employment with these companies, I was actively involved with ITU-T standardization. My involvement with ITU-T included, among other things, work with the VCEG and the Joint Video Team ("JVT") that developed the Advanced Video Coding Standard ("AVC"), which is also known as H.264. From 1995 to 2001, I attended a minimum of 8 standardization meetings every year, and was an active contributor in these meetings on behalf of Teles AG and the German National Body (i.e., the German delegation to the ITU-I, which is a sub-organization of the United Nations).

8. In short, I have extensive knowledge of the workings of the ITU-T's video coding standardization groups, including (but not limited to) VCEG and its meetings, which I discuss below.

9. I provide additional detail regarding my experience and education in my CV, attached hereto as Appendix A.

10. I was also employed by Nokia between 2004 and 2009. My work at Nokia is irrelevant to the issues discussed in this declaration, which relate to events

in 2001 that predate my Nokia employment by several years. In preparing this declaration, I did not consider or rely on any information obtained during my time at Nokia.

III. OVERVIEW OF VCEG AND THE STANDARD-SETTING PROCESS

11. As I note above, ITU's Telecommunication Standardization Sector is known as ITU-T. ITU-T is split up into several study groups, which assemble individuals from around the world to develop voluntary international standards, known as ITU-T Recommendations. Study Group 16, to which I was a delegate during the 2000-2002 timeframe, leads ITU-T's standardization work on multimedia coding, systems, and applications. This includes the "H series" of the ITU-T Recommendations, which relate to audiovisual and multimedia systems. For example, ITU-T Recommendations H.260-H.279 are the standards dealing with coding of moving video. I continue to serve as both a contributor and an expert to Study Group 16, which was responsible for the development of H.26L.

12. VCEG was created to develop standards on visual coding. Due to various reorganizations of the Study Group structure at the end of each ITU Study Period, its official designation has changed over time. For the timeframe relevant here, i.e., 2001, VCEG was the informal name of Question 6 (Visual coding) of Working Party 3 (Media coding) of Study Group 16 (Multimedia coding, systems

and applications) of ITU-T. This official designation may be abbreviated as ITU-T Q.6/16.

13. From its creation in 1998 to the present, the goal of VCEG has been to produce Recommendations (i.e., voluntary international standards) for video coding and image coding methods appropriate for conversational (e.g., videoconferencing and video telephony) and non-conversational (e.g., streaming, broadcast, file download, media storage/playback, or digital cinema) audio/visual services. This work has also involved both the maintenance and extension of existing video coding Recommendations. These voluntary international standards are meant for widespread adoption and implementation industry-wide to achieve interoperability, for example, amongst various types of devices and users.

14. The work of the VCEG has included standards such as H.261 (1990) and H.263 (1998). After completion of H.263, the members of the VCEG were continually developing enhancements and advancements to video coding standards to improve encoding efficiency and provide other capabilities, such as robustness against a loss of data during transmission. These efforts continued throughout the early 2000s. As I note above, VCEG worked on advancements known as H.263+, H.263++, H.26L, and H.264.

15. From 2000 to 2001, delegates of the VCEG met, roughly every quarter, to discuss the development of certain "H series" ITU-T Recommendations. For

example, the VCEG met in January 2001 in Eibsee, Germany, which was the twelfth meeting of the VCEG. VCEG also met in April 2001 in Austin, Texas, which was the thirteenth meeting of VCEG. At these meetings, VCEG was focused on developing the H.26L video coding standard. H.26L was the working name for a standards project that started in approximately 1995. At the time, ITU-T Q.2/15 (informally known as "Low Bitrate Coding" group or "LBC") worked towards a video conferencing solution over modem/telephone networks, and a subgroup was formed to address the lack of sufficient coding efficiency of then-available video codecs. That subgroup decided to split their work into a near term effort, with "H.26N" and "TMN" as working names for the standard and the related test model, and "H.26L" and "TML" as working names for a long-term solution. H.26N and TMN ultimately became ITU-T Rec. H.263. In 1998, with the competition of H.263 version 2 (also informally known as H.263+), and even more so with the completion of version 3 (informally known as H.263++), work towards H.26L became first an important and then the dominant work item in VCEG. The purpose of the H.26L project and its resulting standard, H.264, was to create a standard for use in video telephony and video conferencing applications, among others. This project promised significant advances in the state of the art in standardized video coding.

16. Many members of the VCEG were employed by companies that were actively deploying advanced video coding standards, such as Apple, LG Electronics,

Ericsson, Nokia, and others. The members of VCEG intended to share and distribute their information widely, and members participated with the expectation that their contributions and test models would be shared.

IV. PUBLIC AVAILABILITY OF VCEG DOCUMENTS AND TML-6

17. Based on my decades of participation in video coding standardization committees, including my role as representative of Teles AG and the German National Body explained in Section II, I have extensive personal knowledge regarding the procedures for publishing of video coding standardization-related documents, including test models, and making them publicly available.

18. Accordingly, during the 2001 timeframe, I can confirm that documents uploaded to the VCEG FTP server, including test model documents, were very soon thereafter available for download at the same server to at least hundreds of individuals interested in the development of a video coding standard as of the upload date of the documents on the VCEG FTP server.

19. Prior to each meeting, the approximately 50 participants of the VCEG (at that time) had the option to submit—among other materials—"test model" documents to be discussed at each upcoming meeting, and many exercised that option. Test models, including TML-6, typically consist of two documents: (i) a group of files that together make up a fully functional "source code" of a working video encoder and decoder; and (ii) documentation explaining the functionality of

the source code in prose. Committee members and outside observers used test models as a public record to understand the current state of the standard development and as a shared steppingstone to facilitate further testing, development, and proposals for the standard. For example, the source code can be used as a benchmark to test the benefits and drawbacks of changing or adding particular features or alternatives.

20. According to the procedures set forth around 1996 by the LBC group's Rapporteur, Richard Schaphorst, and reaffirmed through the existence of VCEG by VCEG's Rapporteur, Dr. Gary Sullivan, for most meetings (including the Austin and Eibsee meetings) documents to be discussed at a forthcoming meeting were to be uploaded or emailed for submission at least 10 working days before a given meeting. Members of the VCEG would upload documents to an FTP server's dropbox or upload folder. The read-access to the upload folder of the FTP server was password-protected. On a regular basis, Dr. Sullivan, or his delegate, would review the documents uploaded to the FTP server's upload folder, check them for malware, ensure they were properly formatted and addressed subject matter in VCEG's realm, and would make documents that passed all those tests publicly available within a folder of the FTP server for the meeting at which the document would be discussed. This folder did not (and does not, even today) require a username or password to access the documents contained therein; as noted below, the VCEG used an

anonymous FTP for downloading of documents, such that the folder was freely accessible by the public.

21. The documents made available in that timeframe include specific VCEG documents that I discuss below. For example, I can confirm that (i) H.26L Test Model Long Term Number 6 draft0, VCEG-L45d0 (EX-1007) was available to the public for download at least as of March 10, 2001; and (ii) TML-6 source code (EX-1005)[1] was available to the public for download at least as of March 28, 2001. I am personally familiar with these documents, including because I contributed heavily to certain portions of the TML-6 source code in EX-1005. I was provided these documents by counsel and also obtained these same documents from the current archive of the VCEG. Based on my review, the documents I obtained are identical to those provided by counsel. Further, the documents I obtained, and the documents provided by counsel, appear as they would have when they were initially made publicly available for download as of the dates listed above.

22. During this time (i.e., at least during the 2001 timeframe of the Eibsee and Austin meetings in January and April), these documents were available for

[1] EX-1005 includes excerpts of the entire TML-6 source code. Since the entire source code was available to the public for download, the excerpts of the code in EX-1005 obviously were available as well.

download from at least two different servers. First, the PictureTel company donated web server space and resources to the VCEG and other organizations. Thus, documents of VCEG meetings were accessible from the PictureTel servers at http://standard.pictel.com/ftp/video-site. Second, I maintained an archive of VCEG documents on a server hosted by the Technische Universität Berlin, where I was employed as an Assistant Professor. Thus, documents of VCEG meetings were also accessible during this time period from the university's servers at http://kbs.cs.tu-berlin.de/~stewe/vceg. My affiliation with Technische Universität Berlin ended in 2004; this server ceased to exist at some point after that.

23. Prior to 2003, the document distribution and archival system of the ITU-T itself was rarely used in the VCEG context. This was because the ITU infrastructure servers, while certainly accessible to large parts of the interested public—at least to employees of ITU Sector members, affiliates, and certain invited experts, for example, from academia—were not generally accessible to persons not in the above categories. Thus, VCEG and its predecessor organizations, with the consent of the Study Group hierarchy, decided early on that they wanted to receive the widest possible input from the public, including academia, open source developers, even hobbyists, and so forth, and hence decided to use the most open communication and distribution procedures technically feasible at the time, i.e., using anonymous FTP.

24. In 2003, the data hosted on the PictureTel servers was migrated to the ITU itself. Thus, the ITU itself now hosts the archives of the VCEG's activity, which can be accessed at https://www.itu.int/wftp3/av-arch/video-site/. In a document describing the migration process found in the VCEG archive at https://www.itu.int/wftp3/av-arch/Transfer%20of%20standards.pictel.com%20to%20ITU.htm, Dr. David Lindbergh, the Rapporteur of a related Question in SG16 and the relevant manager at PictureTel at the time, noted that the site had been "operated as an anonymous FTP" (i.e., the site had been accessible to the public, without a password) "because each Question had (and has) at least some invited experts and other interested parties who were unable to access the official ITU-T Question sites." EX-1016. The ITU agreed to take over the site from PictureTel "on the same basis as before—via anonymous FTP."

25. Since 2003, the ITU has occasionally adjusted the folder structure of the VCEG's activity, which can be accessed at https://www.itu.int/wftp3/av-arch/video-site/. In some cases, the adjustment followed the restructuring of the Study Group structure. For instance, the "video-site" sub-folder was created on April 15, 2020 (*see* https://www.itu.int/wftp3/av-arch/). Within that folder, the "h261" sub-folder was created on March 9, 2010 (*see* https://www.itu.int/wftp3/av-arch/video-site/). And, within that folder, the "older_tml" subfolder was also created on March 9, 2010 (*see* https://www.itu.int/wftp3/av-arch/video-site/h26L/). Within

each of these sub-folders, however, the ITU maintained the documents' original upload date to the PictureTel server, and the documents as they appeared on that upload date.

26. During the relevant time period (i.e., at least during the 2001 timeframe of the Eibsee and Austin meetings in January and April), after a document was uploaded, the submitter of the test model would generally also send an email message to the VCEG's email reflector to notify email recipients of the availability of the proposal. Email recipients were not limited to VCEG members. For instance, I understand that it was not unusual for individuals outside the ITU-T's membership to subscribe. Likewise, when I was employed at Technische Universität Berlin, students of mine were routinely subscribed to those reflectors, without being employed by an ITU member or having a different association beyond their subscription to the VCEG mailing list. That includes the 2000 to 2002 timeframe. Members of the general public were thus able to subscribe to the VCEG reflector, and routinely received emails from that reflector.

27. Sending such emails was common during the 2001 timeframe, and I can personally recall sending such emails to notify VCEG participants of my own test model documents. Electronic distribution of the document was the only widely used method of distribution; paper copies were discouraged in the 2001 timeframe. I have personal knowledge of the processes of uploading documents for discussion

at an upcoming meeting and the public availability of documents before and after a meeting, including both the Eibsee and Austin meetings. This is because I routinely submitted proposal documents for discussion at VCEG meetings, including both the Eibsee and Austin meetings. For example, I personally co-authored and uploaded the following documents in preparation of the Eibsee meeting: VCEG-L33 and VCEG-L39. I further personally authored or co-authored and uploaded the following documents for the Austin meeting: VCEG-M04, VCEG-M23, VCEG-M24, VCEG-M74, and VCEG-M79. I also attended both meetings and obtained meeting-related documents for my personal review.

28. Prior to the meetings, including the Eibsee and Austin meetings, participants of the VCEG could download the submissions for their own review in preparation of the meeting. In both cases, I downloaded the Eibsee and Austin meeting documents well before the meeting, printed them, and studied them before the meeting (for example during the flight from Germany to Austin). This includes my own documents, which I downloaded and checked to verify correct upload.

29. VCEG used informally, in the 2000-2002 timeframe, many types of documents addressing many different needs of VCEG. Examples include meeting reports, ad-hoc committee reports, input proposals towards the test model, informational documents, and various output documents. While the document headers and boilerplate were generally similar, the deliberations that took place in

VCEG were different from document type to document type. Reports were generally noted and occasionally corrected, in which case a new version with the same document number but a different revision number was created. Input proposals towards the test model were discussed on their technical merits, sometimes revised (which often led to resubmission with a different revision number), and finally accepted, recommended for further study, or rejected. Informational documents were generally presented and noted without much discussion.

30. In the relevant timeframe and for the H.26L project, VCEG did not distinguish between a draft standard and a test model document. Instead, the group maintained a Test Model Long-Term "TML" document, which was an output document of each meeting and usually received the second-highest meeting document number of each meeting, the highest being reserved for the meeting report. The TML document of the Austin meeting, for example, was VCEG-M8ldl. This document was edited by one or more test model editor(s), based on the deliberation of input documents. Often, the editor required proponents of accepted proposals to integrate their accepted technology into the TML document and edited the document thereafter for terminology, consistency, language, etc.

31. VCEG further maintained a software package that was also known as Test Model Long-term or TML. It was generally attempted to keep the TML software aligned with the TML document. For example, technical proposals were

categorized (into entropy coding, loop filters, motion representation, and the like), presented by their proponents, and then discussed and deliberated by the group. Proponents of adopted technical proposals were required to implement their accepted technology into the TML software, and one or more software coordinators scheduled such integration and checked the input for functionality, code quality and so forth. During the Eibsee and Austin meetings, I served as the software coordinator for VCEG.

32. In my experience, test models tend to be studied carefully by the interested public. For example, I carefully studied the test models of the—at the time—other relevant standardization organization in the field of video coding, the Motion Picture Experts Group ("MPEG"). Correspondingly, and in my experience, attendees of MPEG meetings would carefully review VCEG test models to stay informed on the VCEG's activities. I can recall others in the industry public accessing and discussing such test models during this timeframe and using such documents to keep informed on VCEG's activities and proposals discussed at VCEG meetings.

33. Because the VCEG's activities were intended to be public, the Rapporteur and other members would periodically publish in technical journals summaries of the VCEG activities. For example, Dr. Gary Sullivan published in well-known technical journals articles summarizing some of the work of the VCEG,

which helped inform the larger public about the efforts of the VCEG. As one example, Dr. Gary Sullivan, Thomas Wiegand, and Thomas Stockhammer published an article entitled "Using the Draft H.26L Video Coding Standard for Mobile Applications" in the 2001 Proceedings of the IEEE International Conference on Image Processing. EX-1012. This conference was held in October 2001. In that article, the authors specifically point interested readers to the PictureTel server and the Technische Universität Berlin server where "information, documents and software for the" H.26L project can be found. Persons interested in the development of multimedia and video coding standards would have reviewed articles associated with the IEEE International Conference on Images Processing to keep abreast of developments in such topics, and thus would have had reason to review Dr. Sullivan's article about H.26L.

34. In addition, I am aware of several articles published in well-known technical journals, and a leading textbook on video codec design, that acknowledge that TML-6 was available to those interested in the development of multimedia and video coding standards in "March 2001." *See* Ushashree, *Video Compression Based on RMB*, International Journal of Electronics Communication and Computer Engineering (2013) at 57, 60 (EX-1013); Richardson, Video Codec Design: Developing Image and Video Compression Systems (2002) at 92 (EX-1014). For example, Markus Flierl, Thomas Wiegand, and Bernd Girod published an article

entitled "Multihypothesis Pictures for H.26L" in the 2001 Proceedings of the IEEE International Conference on Image Processing. EX-1015. This conference was held in October 2001. In that article, the authors specifically cite VCEG-L45d0 with a "Mar. 2001" publication date, and point interested readers to the PictureTel server. EX-1015 at 529 (endnote 6).

35. Additionally, from its inception, the VCEG had a general policy of making VCEG documents publicly available. Thus, at least during 2001, VCEG documents uploaded onto the VCEG's servers would have been mirrored to and available for download from other websites by at least hundreds of individuals interested in the development of multimedia and video coding standards. By way of example, while an individual company would have one or two participants at a given VCEG meeting, those participants frequently worked with numerous colleagues at their company. For instance, I shared not only my own, but also other meeting documents related to the VCEG's work with my students at Technische Universität Berlin. Those colleagues were frequently interested in the development and the progress of the VCEG's work and would regularly obtain and review documents and test models submitted for discussion at VCEG meetings.

36. Consistent with the general policy of VCEG, there were no restrictions for downloading documents available from the VCEG sites during at least 2001, including the documents of the Eibsee and Austin meetings, specifically the TML-6

source code (excerpted in EX-1005) and VCEG-L45d0 (EX-1007). Indeed, as I note above, one of the locations at which the VCEG documents were available to download was a server hosted by the Technische Universität Berlin under my academic account, and I imposed no restrictions on downloading documents from that location. Moreover, based on my knowledge and recollection, given the relevance of the VCEG in the video coding industry, persons interested in tracking the developments of the latest video coding standard would regularly visit the VCEG sites to ensure that products and services they were developing were consistent with the standards under development. In fact, I and many of my colleagues would regularly review submissions from each meeting from the VCEG websites.

37. Thus, in my opinion, individuals interested in the art of video coding would have known and appreciated in the 2001 timeframe that the documents on the VCEG site represented the latest developments in the standards being developed by the VCEG, including the "H series" of ITU-T Recommendations noted above. For example, an individuals interested in the art of video coding would have known that the test models discussed at VCEG meetings would have represented and included details of the technologies relating to the standard under development, including technologies that had the potential to make their way into the standard under development. A person interested in video coding technologies would have known to review the test model documents for proposals of interest that were discussed at a

given meeting and navigate to the folder for the meeting on the VCEG site to view and download documents of interest, including documents with revision codes. This would have led such a person to the documents discussed in this declaration, including the TML-6 source code (excerpted in EX-1005) and VCEG-L45d0 (EX-1007).

38. As shown in EX-1017, the current archive of the VCEG website, now hosted by the ITU itself (https://www.itu.int/wftp3/av-arch/video-site/h26L/older_tml/), indicates that both the TML-6 source code (excerpted in EX-1005) and VCEG-L45d0 (EX-1007) were uploaded in March 2001. Specifically, the upload date of the TML-6 source code—which appears in EX-1017 under the file name "***tml6pre.zip***"—is March 28, 2001. The upload date of VCEG-L45d0 (EX-1007)—which appears in EX-1017 under the file name "***tml6d0.doc***"—is March 10, 2001. As I noted above, I attended this meeting and am personally familiar with the process by which the test model documents would have been uploaded and available for download. Thus, the TML-6 source code (excerpted in EX-1005) would have been available for download at least as of its upload date of March 28, 2001. VCEG-L45d0 (EX-1007), on the other hand, would have been available for download at least as of its upload date of March 10, 2001. I have no reason to doubt that these documents were uploaded using the procedures discussed

above. Similarly, I have no reason to doubt that the upload dates of these documents are inaccurate in any way.

V. SUPPLEMENTATION OF CONCLUSIONS

39. I reserve the right to supplement my conclusions in the future to respond to any arguments that the Patent Owner raises and to take into account new information as it becomes available to me. I may supplement or amend my conclusions, and bases for them, in response to any opinions offered by the Patent Owner's experts. I may also supplement or amend my conclusions, and bases for them, in light of additional evidence, testimony, discovery, arguments on the part of the Patent Owner, or additional information I may become aware of after the date of this declaration. I may also prepare appendices, demonstrative appendices, summaries, tutorials, demonstrations, charts, drawings, tables, or animations to supplement or demonstrate my conclusions as appropriate.

VI. AVAILABILITY FOR CROSS-EXAMINATION

40. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.