No. 17-2145

IN THE

United States Court of Appeals for the Federal Circuit

CISCO SYSTEMS, INC.,

Plaintiff-Appellant,

v.

ARISTA NETWORKS, INC.,

Defendant-Appellee.

APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF CALIFORNIA,
JUDGE BETH LABSON FREEMAN

BRIEF OF PUBLIC KNOWLEDGE AS *AMICUS CURIAE* IN SUPPORT OF DEFENDANT-APPELLEE

CHARLES DUAN
Counsel of Record
MEREDITH F. ROSE
PUBLIC KNOWLEDGE
1818 N Street NW, Suite 410
Washington, DC 20036
(202) 861-0020
cduan@publicknowledge.org

Counsel for amicus curiae

CERTIFICATE OF INTEREST

Pursuant to Rules 29(a) and 47.4 of the Federal Circuit Rules of Practice, counsel of record certifies as follows:

(1) The full name of every party or amicus represented by counsel to this brief is **Public Knowledge**.

(2) The above-identified parties are the real parties in interest.

(3) The corporate disclosure statement of Rule 26.1 of the Federal Rules of Appellate Procedure is as follows: There is no parent corporation to or any corporation that owns 10% or more of stock in the above-identified parties.

(4) The names of all law firms and the partners and associates that have appeared for the party in the lower tribunal or are expected to appear for the party in this court are: **Charles Duan, Meredith Rose, Arian Attar (not admitted), Public Knowledge**.

(5) No cases are known to counsel to be pending in this or any other court or agency that may directly affect or be directly affected by this appeal.

Dated: December 23, 2017

/s/ Charles Duan
Charles Duan
Counsel for amicus curiae

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INTEREST OF *AMICUS CURIAE*

Public Knowledge[1] is a non-profit organization that is dedicated to preserving the openness of the Internet and the public's access to knowledge, promoting creativity through balanced intellectual property rights, and upholding and protecting the rights of consumers to use innovative technology lawfully. Public Knowledge advocates on behalf of the public interest for a balanced patent system, particularly with respect to new and emerging technologies.

[1]Pursuant to Federal Rule of Appellate Procedure 29(a), all parties received appropriate notice of and consented to the filing of this brief. Pursuant to Rule 29(c)(5), no counsel for a party authored this brief in whole or in part, and no counsel or party made a monetary contribution intended to fund the preparation or submission of the brief. No person or entity, other than *amicus*, its members, or its counsel, made a monetary contribution to the preparation or submission of this brief.

SUMMARY OF ARGUMENT

This case is exceptionally important because of its potential real-world industry impact. That impact may be seen through one unique but critical portion of the information technology field: technical standards for electronic communication. Information technology relies on standards that define how computer systems communicate with each other, standards that are mostly developed by standard-setting organizations in partnership with industry. Standard-setting is thus a useful window into the technology industry overall.

In particular, the practical import of this case is illuminated by comparison with an analogous matter that this Court has considered before: patents and the technical standard-setting process, relating to standard-essential patents and FRAND policies. The systematic lack of attention to comparable copyright licensing policies reveals industry's expectation that the acts complained of in this case are not copyright infringement. There is no reason to upset that expectation.

1. Arista produces network switches that implement (that is, they are programmed to use and understand) the same commands as Cisco's switches. Cisco argues that this activity of *implementation* is an illegal copyright infringement of Cisco's "compilations of multiword commands."

Implementing someone else's commands is not atypical activity. Numerous technical standards, such as those for email, the Internet, Wi-Fi, and USB, include

compilations of multi-word commands. Technologies that conform to those standards must implement those commands. If Arista's switches infringe copyright, then so does potentially every email program, web browser, smartphone, laptop, and computer peripheral in use today.

2. Practices of standard-setting organizations show that Cisco is wrong on its copyright infringement theory, at least in the eyes of industry, for the following reasons. Standard-setting organizations want their standards to be widely implemented, and widespread implementation is unlikely if implementers are potentially liable for patent or copyright infringement. In the case of patents, the organizations seek to avoid disputes by maintaining complex patent licensing policies, sometimes called FRAND policies. Every major standard-setting organization appears to have a detailed patent policy.

Technical standards also contain compilations of multi-word commands. So if implementing commands were an infringement of copyright, then one would expect standard-setting organizations to have copyright licensing policies on par with their patent policies. Yet no standard-setting organization appears to have a copyright policy even approaching the simplest FRAND policy, and many organizations have no relevant copyright policy at all. The absence of copyright licensing policies suggests that, according to those in the technology industry, implementing command compilations is not copyright infringement.

3. Approval of Cisco's theory of copyright infringement could introduce immediate uncertainty for existing standards and technologies. As noted above, many standards organizations do not impose appropriate copyright licensing obligations (because the organizations did not expect copyright to be a concern). Without such obligations, copyright could create the same holdup problems that this Court has expressed concern about in the patent context.

This Court has repeatedly sought, in cases such as *Ericsson, Inc. v. D-Link Systems, Inc.* and *Qualcomm Inc. v. Broadcom Corp.*, to encourage standards-based technological innovation by interpreting patent law in ways that do not disturb settled standard-setting practices and expectations. Copyright law, too, should be interpreted so that it does not impede innovation in the standards-based industry, but rather promotes its progress.

ARGUMENT

I. Multi-Word Command Implementation, Which Cisco Accuses as Infringement, Is Common Across Information Technology

The act by Arista that Cisco accuses as copyright infringement is implementation of a "compilation of multiword command expressions" for controlling network switch devices.[2] That act of implementation is not unusual; it is in fact prevalent across modern technology, because nearly every modern computer- or electronics-based technology conforms to one or more technical standards, and conforming to a technical standard almost always requires implementing multiword commands in the same manner that Arista did.

A. Modern Technologies, such as Wi-Fi, Email, Television, and the Internet, Are Based on Technical Standards

Computers and other electronic devices communicate with each other, and their ability to communicate depends on technical standards. As a result, most modern technologies are based on technical standards.

Technical standards are "specifications that ensure that a variety of products from different manufacturers operate compatibly."[3] Especially relevant today are

[2]Though Cisco accuses other material as infringing, the focus of Cisco's brief is on command compilations. This brief focuses on the same. Arista disputes (at 69) whether Cisco's commands are a properly registered "compilation"; the term "compilation" herein refers to the "selection and arrangement of Cisco's multiword command-line expressions," as used by Arista (at 19).

[3]*Microsoft Corp. v. Motorola, Inc.*, 795 F.3d 1024, 1030 (9th Cir. 2015).

standards of electronic communication that define the protocols, or languages, that "enable products designed and produced by different companies to operate and communicate with one another."[4]

Standards underlie key technologies and enormous economic industries. They allow us to "connect to WiFi in a coffee shop, plug a hairdryer into an outlet, or place a phone call."[5] Information technologies in particular, such as email, television, and the Internet, all operate based on technical standards.[6] According to the National Academy of Sciences: "The technologies embodied in today's complex microelectronic products, such as a smartphone, are governed by hundreds of standards," and generally "the Internet and cellular networks rely heavily on interoperability standards"; those standards-dependent industries generate "aggregate economic activity approaching $2 trillion per year."[7]

B. Technical Standards Comprise Compilations of Multi-Word Commands, Which Must Be Implemented

To *implement* a technical standard means to develop a device or system that conforms to the standard; that is, to make something that "understands the language" specified by the standard. Implementing a standard almost inevitably

[4]Nat'l Acad. of Scis., Patent Challenges for Standard-Setting in the Global Economy 16 (Keith Maskus & Stephen A. Merrill eds., 2013).

[5]*Microsoft*, 795 F.3d at 1030.

[6]These standards are reviewed in the following section.

[7]Nat'l Acad. of Scis., *supra* note 4, at 26.

requires an act akin to what Cisco accuses as copyright infringement in this case. That is because information technology standards include compilations of commands, even commands of multiple words. Implementing a standard requires developing a system that responds to the command compilation specified in the standard, in the same way that Arista developed a switch that responds to Cisco's compilation of commands.[8]

Compilations of multi-word commands are found in several exemplary technical standards, representative of the many in widespread use today.

Web page formatting. The fonts, colors, arrangement, and other aspects of laying out a web page are specified according to a standard called Cascading Style Sheets, or CSS.[9] According to the standard, a web page creator writes "declarations" that define how portions of the page should be presented.[10]

CSS declarations are hierarchies of multi-word commands. Figure 1 provides one such hierarchy, for drawing borders around text. To draw a red border line under some text on a web page, for instance, one would write "`border-bottom-color: red`."[11] The CSS specification lists over 350 decla-

[8]It is irrelevant that Cisco's command set was not based on a standard; the act of implementing is no different whether the commands come from a standard or Cisco's manuals.

[9]*See* Cascading Style Sheets Level 2 Revision 1 Specification (Bert Bos et al. ed., W3C Recommendation June 7, 2011) [hereinafter CSS 2.1 Specification], https://www.w3.org/TR/2011/REC-CSS2-20110607/.

[10]*See id.* §§ 4.1.7–.8.

[11]*See id.* § 8.5.

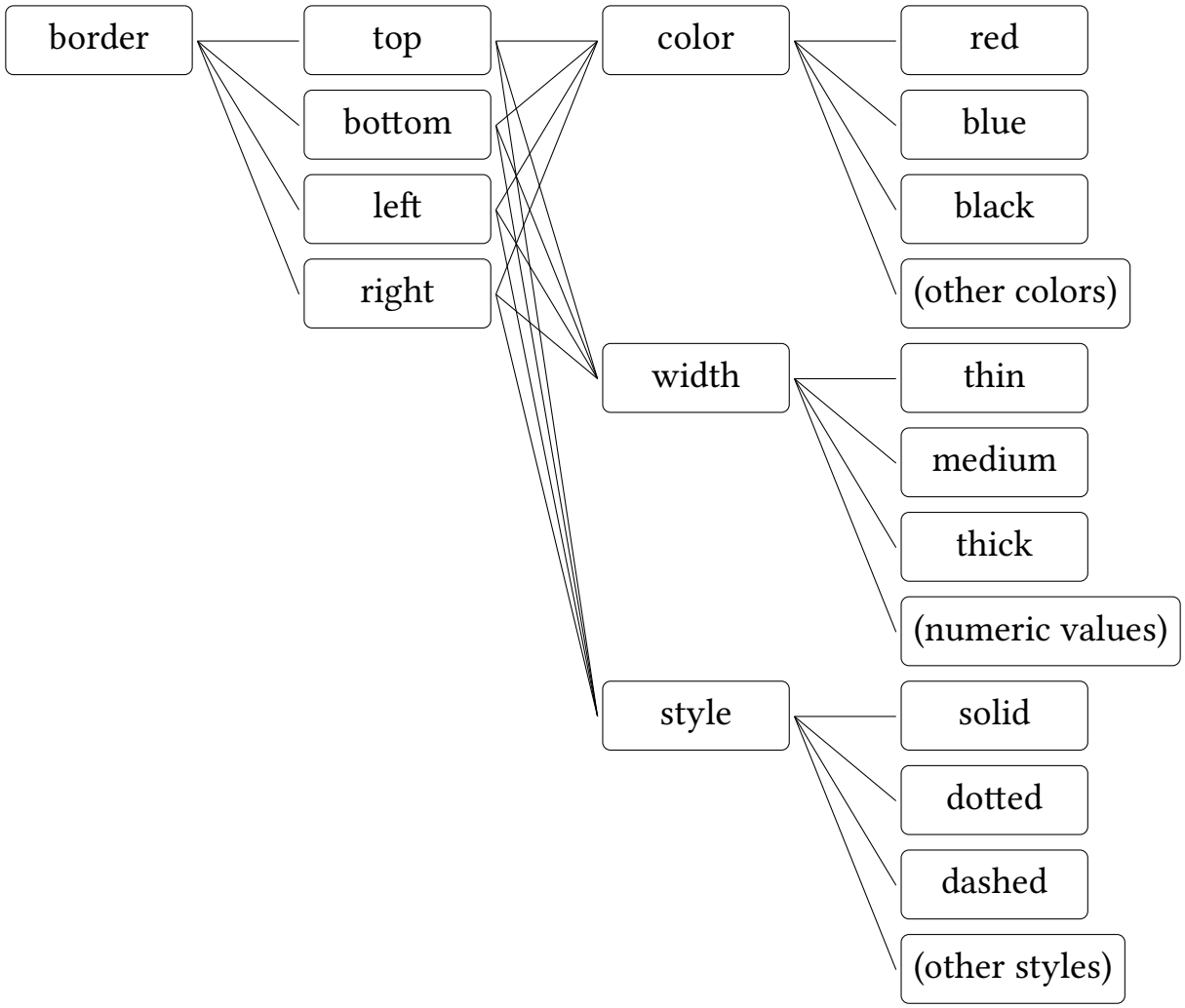

Figure 1: Some CSS commands for drawing borders on portions of web pages. Each left-to-right path represents a multi-word command, with punctuation between words omitted. These figures are intentionally drawn to reflect similarity to the figures in Cisco's brief (at 9–10).

rations, not including numeric values or more complex combinations of words (which permit for infinite variation).[12]

Several features of CSS are remarkably similar to Cisco's command-line interface. Cisco's brief emphasizes (at 11, 42, and 47) its engineers' preference for hyphens over dots in command names; the creator of CSS, too, opted for hyphens over dots to make CSS "look more like written English."[13] Cisco describes (at 6) its commands as "declarative sentences that are read and understood by a human operator"; CSS commands too are "declarations" written to be "human readable and writable."[14] Cisco leans heavily (at 7) on how its "engineers were free to choose the text and structure" of commands; CSS developers also were free to choose the text and structure of CSS commands, and even changed the names of several commands during development of the standard.[15] These features are irrelevant to the copyright analysis for reasons stated in the briefs of Arista and

[12] *See id.* app. F.

[13] Bruce Lawson, *CSS: It Was Twenty Years Ago Today—An Interview with Håkon Wium Lie*, Dev.Opera (Oct. 10, 2014), https://dev.opera.com/articles/css-twenty-years-hakon/.

[14] CSS 2.1 Specification, *supra* note 9, § 2.4.

[15] The grid-layout portion of the CSS standard, for example, originally had commands "`grid-row-align: start`" and "`grid-column-align: center`"; they were later changed to "`align-self: start`" and "`justify-self: center`." *Compare* Alex Mogilevsky et al., *Grid Layout* § 8 (W3C, Working Draft, Apr. 7, 2011), https://www.w3.org/TR/2011/WD-css3-grid-layout-20110407/, *with* Tab Atkins Jr. et al., *CSS Grid Layout* §§ 10.3–10.4 (W3C, Candidate Recommendation, Dec. 14, 2017), https://www.w3.org/TR/2017/CR-css-grid-1-20171214/.

other *amici*,[16] but insofar as Cisco touts these features as exceptional or unique, the CSS standard shows that they are actually commonplace.

Email. The standard for sending email messages is called the Simple Mail Transfer Protocol, or SMTP. It is specified in standards documents called "Requests for Comment" or RFCs.[17] While in early years RFCs were genuine requests for peer review, today "they are published only after a lot of vetting" and industry treats them as accepted standards.[18]

To send email according to the SMTP standard, a computer issues commands to an email server, as illustrated in Figure 2. These commands include multiple words, such as "`MAIL FROM`" and "`RCPT TO`."[19] The SMTP standard defines eleven basic commands,[20] and "Extended SMTP" adds further commands for features such as encryption, authentication, and international character encodings.[21]

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[16] *See, e.g.,* Arista Br. 26–27. The briefs of Professor Samuelson, EFF, and CCIA are expected to address these issues as well.

[17] *See* Simple Mail Transfer Protocol (J. Klensin ed., Internet Eng'g Task Force, RFC 5321, Oct. 2008), https://www.rfc-editor.org/rfc5321.txt.

[18] Stephen D. Crocker, *How the Internet Got Its Rules*, N.Y. Times, Apr. 7, 2009, at A29, http://www.nytimes.com/2009/04/07/opinion/07crocker.html.

[19] *See* RFC 5321, *supra* note 17, at 19.

[20] *See id.* at 32–40.

[21] *See* P. Hoffman, SMTP Service Extension for Secure SMTP over Transport Layer Security (Internet Eng'g Task Force, RFC 3207, Feb. 2002), https://www.rfc-editor.org/rfc3207.txt; SMTP Service Extension for Authentication (R. Siemborski et al. ed., Internet Eng'g Task Force, RFC 4954, July 2007), https://www.rfc-editor.org/rfc4954.txt; J. Yao & W. Mao, SMTP Extension for Internationalized Email (Internet Eng'g Task Force, RFC 6531, Feb. 2012), https://www.rfc-editor.org/rfc6531.txt.

Data sent/received	Explanation of command
SERVER: `220 smtp.example.com`	
CLIENT: `HELO 203.0.113.1`	*Introduce client*
SERVER: `250 smtp.example.com`	
CLIENT: `MAIL FROM:<bob@example.com>`	*Send an email*
SERVER: `250 Ok`	
CLIENT: `RCPT TO:<alice@example.com>`	*Provide email recipient*
SERVER: `250 Ok`	
CLIENT: `DATA`	*Provide message content*
SERVER: `354 End data with .`	
. . . Content of email is transmitted here . . .	
CLIENT: `.`	
SERVER: `250 Ok: queued as 12345`	
CLIENT: `QUIT`	
SERVER: `221 Bye`	

Figure 2: Example communication according to the SMTP standard. The client is the computer seeking to send an email to the server.

Like Cisco's command-line interface, SMTP is designed to be simple (as its name suggests) and usable by a human operator. SMTP commands are generally four-letter sequences resembling English words; any person can open a terminal window on a computer, enter "`telnet gmail-smtp-in.l.google.com 25`" and proceed to send email by typing commands.[22]

Wi-Fi. Laptops and mobile devices usually connect wirelessly to the Internet via a standard called 802.11, colloquially Wi-Fi.[23] According to that standard, data is transferred in the form of structured chunks called "frames."[24] Each frame begins with a header comprising several numeric codes, which act as command words that instruct the recipient on how to process the frame.[25] Figure 3 shows a sample of 2–3 word Wi-Fi frame header commands. The sequence "`01 0110 1000`," for example, transmits the "sector sweep" command.[26]

Commands in Wi-Fi frame headers are only the basics; other features specified in the standard, such as authentication, involve further commands.[27] Cer-

[22]The message will almost certainly bounce unless it complies with standards such as MIME, DKIM, SPF, and DMARC—all of which contain further commands which email systems must implement.

[23]*See* IEEE-SA Standards Bd., IEEE Std. 802.11-2016, Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications (2016), *available at* http://ieeexplore.ieee.org/document/7786995/.

[24]*See id.* cl. 9.1, at 636.

[25]*See id.* cl. 9.2.4.1.1, at 638.

[26]*See id.* cl. 9.2.4.1.3, at 639–40.

[27]*See id.* ch. 12, at 1923–2088.

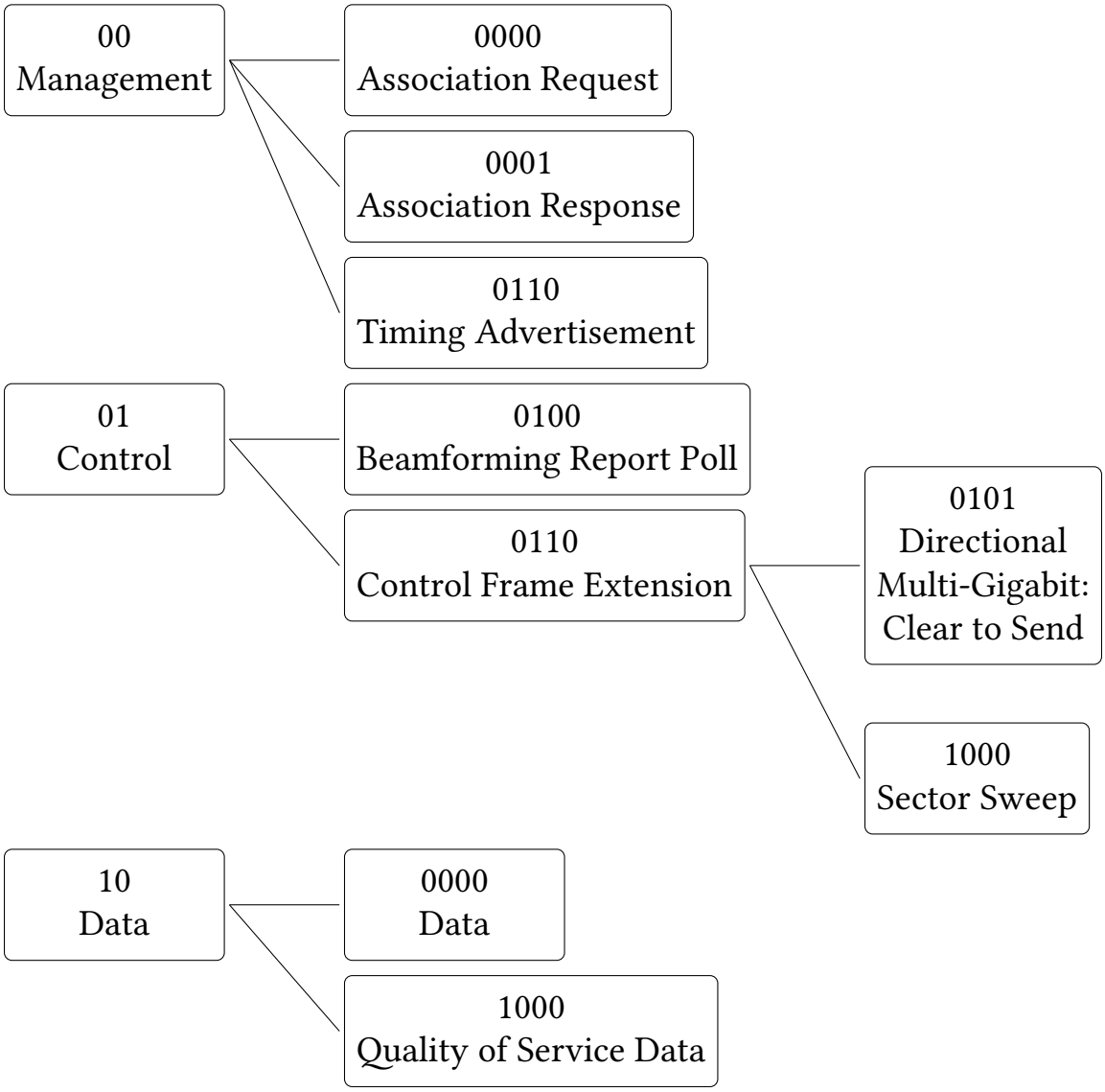

Figure 3: Some command words defined in the 802.11 Wi-Fi standard. The binary numbers are the actual words transmitted; the text describes each command word's meaning.

tainly these are words spelled with digits rather than alphabetic characters, but Cisco's brief offers no substantial reason to distinguish the two.[28]

Peripheral devices. Most external computer peripherals (keyboards, mice, and printers for example) connect by USB port. USB stands for Universal Serial Bus, which specifies not just a plug shape but also an extensive language by which peripherals communicate with computers.

When a USB device connects to a computer, the computer may issue one or more commands, called "device requests," to collect information from the device or adjust the device's settings. Implementing a USB device requires implementing responses to these commands.[29] The commands are structured as a hierarchy of phrases of at least three binary words: a request type, a request, and a value.[30]

Multimedia. Television and online video are generally stored and transmitted according to the H.264 video encoding standard, one that includes numerous command words.[31] If that video is shown on a recent television or computer

[28]Indeed, binary numbers used in standards can reflect a degree of aesthetic judgment. *See* E. Fleischman, WAVE and AVI Codec Registries 3 (Internet Eng'g Task Force, RFC 2361, June 1998), https://www.rfc-editor.org/rfc2361.txt (standard that assigns 32-bit integers for identifying audiovisual codecs, with the integers selected to resemble four-letter mnemonics).

[29]*See* Apple Inc. et al., Universal Serial Bus 3.2 Specification § 9.4, at 329 (Sept. 22, 2017), *available at* http://www.usb.org/developers/docs/.

[30]*See id.* § 9.4, tbls.4–6, at 330–31.

[31]*See, e.g.*, Int'l Telecomm. Union, Rec. H.264, Advanced Video Coding for Generic Audiovisual Services 62–64 (12th ed. Apr. 2017), *available at* http://www.itu.int/rec/T-REC-H.264-201704-I (describing "NAL units," commands that

monitor, it is likely sent via the High-Definition Multimedia Interface standard, or HDMI, which incorporates compilations of command words.[32] If it is broadcast over air, cable, or satellite, the video signal likely conforms to standards adopted by the Advanced Television Systems Committee; those standards include further command compilations for features such as closed captioning.[33]

The foregoing examples show that technical standards, of the kind that underlie all kinds of information technology today, regularly include compilations of multi-word commands that must be implemented.

II. Industry Practices Reveal an Expectation that Compilations of Commands Are Not Subject to Copyright Protection

Standard-setting organizations receive third-party contributions of command compilations and patentable inventions. All organizations appear to take nuanced measures to deal with contributions of patentable inventions. Those same organizations lack equivalent copyright policies directed to contributions of com-

"provide header information in a manner appropriate for conveyance on a variety of communication channels or storage media").

[32] *See* Digital Content Prot. LLC, High-Bandwidth Digital Content Protection System: Mapping HDCP to HDMI 57–62 (2.2 ed. Feb. 13, 2013), *available at* https://www.digital-cp.com/hdcp-specifications (describing "authentication protocol messages"). The HDMI standard itself is not public, but it incorporates HDCP.

[33] *See* Advanced Television Sys. Comm., Doc. A/343:2017, ATSC Standard: Captions and Subtitles § 3.5 (Sept. 18, 2017), *available at* https://www.atsc.org/wp-content/uploads/2016/12/A343-2017-Captions-and-Subtitles-1.pdf (incorporating XML commands of another standard).

mands, suggesting that the organizations and industry do not believe that contributions of commands implicate copyright.

A. Standard-Setting Participants Contribute Both Patentable Technologies and Compilations of Commands to Standards

Standard-setting organizations receive third-party contributions of ideas to include in a standard being developed. Those contributions obviously may include patentable inventions,[34] but they also include compilations of commands.

1. A *standard-setting organization* is a private entity that coordinates the development of technical standards. The organizations reviewed in this brief are listed in Figure 4. The list includes the sponsors of each of the standards discussed in Section I.B, plus ANSI, who sets procedural guidelines for and accredits other standard-setting organizations.

The process of developing a standard within a standard-setting organization is described in *Ericsson, Inc. v. D-Link Systems, Inc.* and in IEEE's comprehensive *amicus* brief in that case.[35] Briefly, the process is as follows. A standard-setting organization, such as IEEE, will form a working group to draft a standard for a particular technological subject, such as Wi-Fi. In most cases, the working groups "strive for broad representation of all interested parties" and are "open to

[34] *See, e.g.*, Nat'l Acad. of Scis., *supra* note 4, at 16.

[35] *See* 773 F.3d 1201, 1208–09 (Fed. Cir. 2014); Brief of *Amicus Curiae* IEEE at 5–12, *Ericsson*, 773 F.3d 1201 (Dec. 20, 2013) (No. 13-1625) [hereinafter IEEE Brief].

Abbr.	Standard-Setting Org.	Standards Developed
IEEE	Institute of Electrical and Electronics Engineers	802.11 Wi-Fi standard
IETF	Internet Engineering Task Force	SMTP standard and other RFCs
W3C	World Wide Web Consortium	Web pages, CSS standard
ATSC	Advanced Television Systems Committee	Digital television standards
ITU, ISO, IEC	International Telecommunication Union, International Organization for Standardization, International Electrotechnical Commission	Multimedia formats such as H.264 video
ANSI	American National Standards Institute	Accredits other standard-setting organizations
USB	Universal Serial Bus Implementers Forum	Computer peripherals
HDMI	High Definition Multimedia Interface Forum	Audiovisual signals for televisions, computer monitors, and sound systems

Figure 4: Standard-setting organizations whose patent and copyright policies have been reviewed in this brief.

participation by anyone."[36] Working group members contribute proposals to the group, which are put to discussions, votes, and various levels of approval.[37]

The key point is that standard-setting organizations are not the sole authors; standards are written based on "cooperation of a number of interested parties."[38] Promulgated standards incorporate these third-party contributions.

2. Examples of contributions to standards, including contributions of multi-word command compilations, may be found in the standards described previously in Section I.B. Some of those standards are omitted here, because their contribution processes were not publicly accessible or too voluminous to review.

CSS. Third parties contribute many subsets of CSS commands. For example, portions of a web page can be animated (text can move, change size, or disappear), and those animations are controlled by a set of transition commands, some of which are described in Figure 5.[39] The command words were developed by Apple in 2007, and contributed to the CSS standard in 2009.[40]

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[36] IEEE Brief, *supra* note 35, at 8.

[37] *See id.* at 9–11.

[38] *Ericsson*, 773 F.3d at 1209.

[39] *See* L. David Baron et al., Mozilla & Apple Inc., *CSS Transitions* (W3C, Working Draft, Nov. 30, 2017), https://www.w3.org/TR/2017/WD-css-transitions-1-20171130/.

[40] *See* Dave Hyatt, *CSS Animation*, Apple WebKit Blog (Oct. 31, 2007), https://webkit.org/blog/138/css-animation/; Dean Jackson et al., Apple Inc., *CSS Animations Module Level 3* (W3C, Working Draft, Mar. 20, 2009), https://www.w3.org/TR/2009/WD-css3-animations-20090320/.

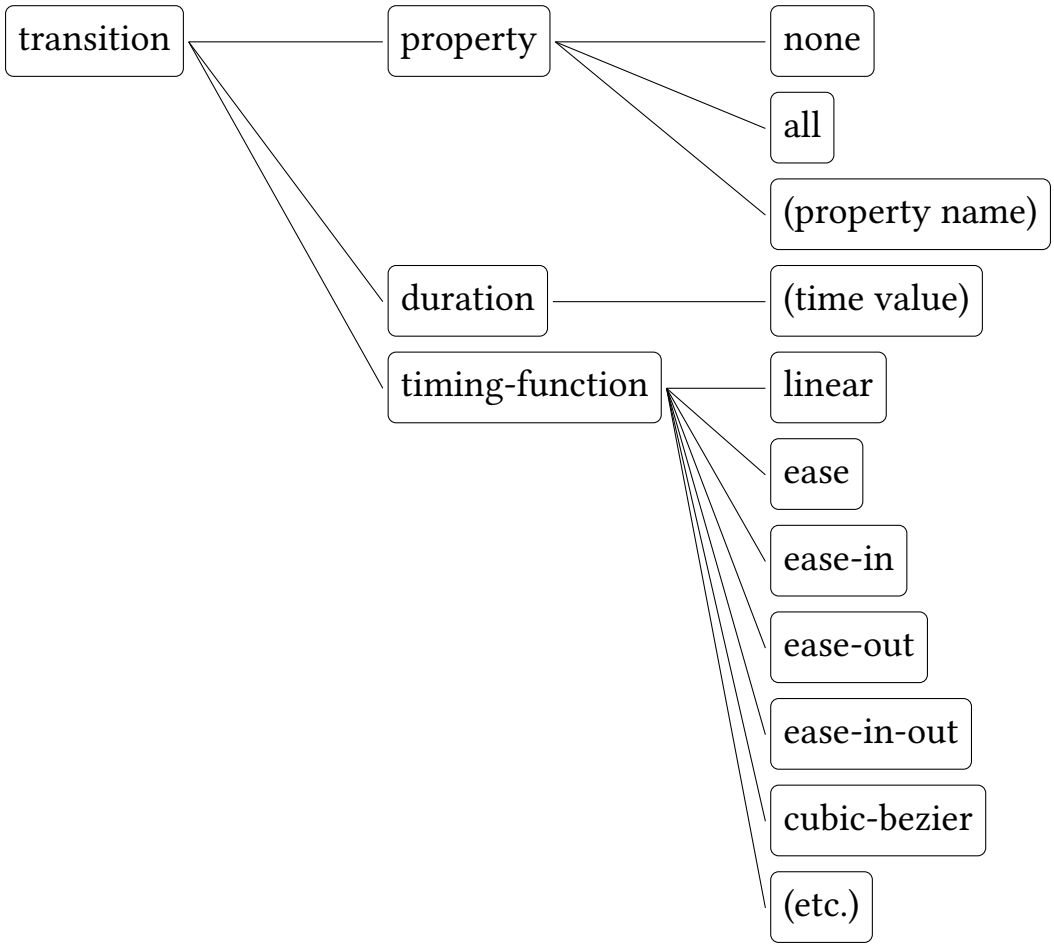

Figure 5: CSS commands for transitions (animations), as created by Apple and contributed to the CSS standard.

SMTP. Third-party companies have contributed commands to the SMTP[41] standard to add new functionalities. For example, to prevent spam many SMTP email servers require authentication based on standards authored by engineers at companies such as Netscape, Lucent, Google, and Isode.[42] The authentication commands include multiple words, as illustrated in Figure 6.[43]

USB. Computer peripherals meeting the USB standard are divided into classes of device types, such as audio devices, billboards, mass storage (such as flash drives), printers, and smart cards. Each class of devices implements both the general USB standard and a class-specific standard, the latter of which may add additional commands specific to the device type. For example, the USB audio class standard adds commands for controlling the volume level, muting the device, and adjusting the bass and treble output, among many other commands.[44]

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[41] More accurately, Extended SMTP or ESMTP.

[42] *See* RFC 4954, *supra* note 21, at 19; *see also* S. Josefsson & N. Williams, Using Generic Security Service Application Program Interface (GSS-API) Mechanisms in Simple Authentication and Security Layer (SASL): The GS2 Mechanism Family 7 (Internet Eng'g Task Force, RFC 5801, July 2010), https://www.rfc-editor.org/rfc5801.txt; C. Newman et al., Salted Challenge Response Authentication Mechanism (SCRAM) SASL and GSS-API Mechanisms 9 (Internet Eng'g Task Force, RFC 5802, July 2010), https://www.rfc-editor.org/rfc5802.txt; T. Hansen, SCRAM-SHA-256 and SCRAM-SHA-256-PLUS Simple Authentication and Security Layer (SASL) Mechanisms (Internet Eng'g Task Force, RFC 7677, Nov. 2015), https://www.rfc-editor.org/rfc7677.txt.

[43] *See* RFC 4954, *supra* note 21, at 3–7.

[44] *See* Universal Serial Bus Device Class Definition for Audio Devices 1.0, § 5.2.2.4.3, at 75–80 (Mar. 18, 1998), http://www.usb.org/developers/docs/devclass_docs/audio10.pdf.

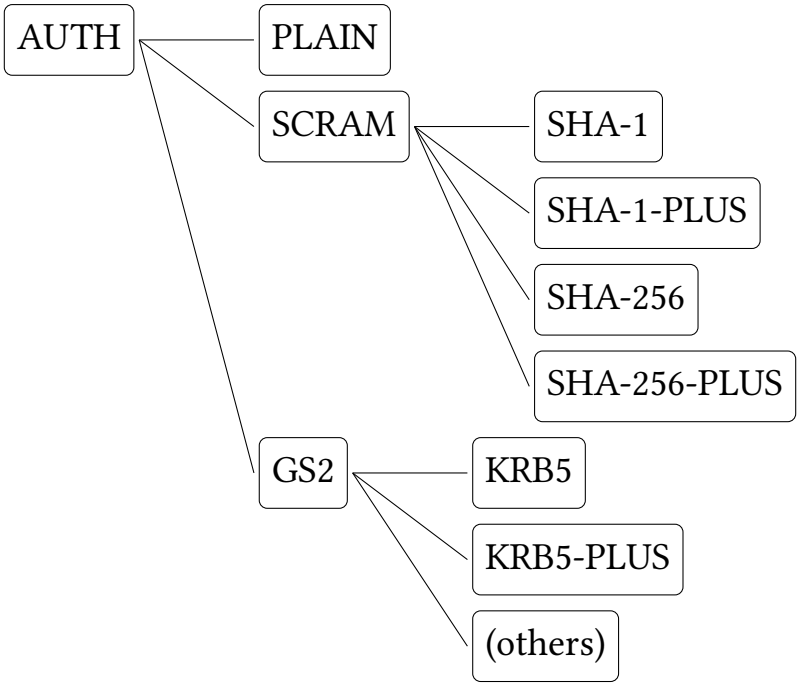

Figure 6: Partial command word hierarchy for SMTP authentication, based on RFC 4954 and other standards.

The class-specific standards are third-party contributions to USB. The audio standard, for example, appears to have originated from an engineer at Philips, and now has contributors from IBM, Microsoft, Altec Lansing, Dolby, and Logitech.[45]

Television. ATSC's standard for closed captions and subtitles incorporates other standards by reference, such as SMPTE Timed Text (a standard by the Society of Motion Picture and Television Engineers), and Timed Text Markup Language.[46] Each of these standards contributes words to the complete command set of the ATSC closed captioning standard.

B. For Contributions of Patentable Technologies, Standard-Setting Organizations Maintain Complex Licensing Policies

Anyone who accepts third-party contributions of ideas ought to be concerned with intellectual property rights, and standard-setting organizations are no exception. Intellectual property rights on technology incorporated into a standard can cause *holdup*, which this Court described as the situation where a holder of intellectual property essential to a technical standard "demands excessive royalties after companies are locked into using a standard."[47]

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[45] *See id.* at ii.

[46] *See* Advanced Television Sys. Comm., *supra* note 33, at 4.

[47] *Ericsson, Inc. v. D-Link Sys., Inc.*, 773 F.3d 1201, 1209 (Fed. Cir. 2014) (citing IEEE Brief, *supra* note 35, at 16–18); *see also* U.S. Dep't of Justice & Fed. Trade Comm'n, Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition 35 (2007) [hereinafter FTC-DOJ Report], *available at* http://www.usdoj.gov/atr/public/hearings/ip/222655.pdf.

Holdup can discourage implementation of a standard, so standard-setting organizations ought to take measures to avoid holdup. With regard to patents, that is exactly what happens: Every standard-setting organization appears to have a detailed policy on patent licensing designed to prevent holdup.[48]

Patent policies differ across organizations but largely seek to accomplish three goals. First, standard-setting organizations generally require disclosure of *standard-essential patents*, namely those covering technology that implementers of the standard must use; working groups issue "calls for patents" to obtain those disclosures.[49] Second, the organizations require holders of standard-essential

[48] *See generally* Nat'l Acad. of Scis., *supra* note 4, at 31 (also reviewing patent policies of standard-setting organizations).

[49] *See* IEEE-SA Standards Bd., Operations Manual § 6.3.2, at 37 (Dec. 2016), *available at* http://standards.ieee.org/develop/policies/opman/sb_om.pdf; IEEE-SA Standards Bd., Bylaws § 6.2, at 19 (Dec. 2016) [hereinafter IEEE Bylaws], *available at* https://standards.ieee.org/develop/policies/bylaws/sb_bylaws.pdf; Int'l Telecomm. Union, Understanding Patents, Competition and Standardization in an Interconnected World 88 (2014) [hereinafter ITU Patent], *available at* http://www.itu.int/en/ITU-T/Documents/Manual_Patents_Final_E.pdf; S. Bradner & J. Contreras, Intellectual Property Rights in IETF Technology § 5.1, at 10 (Internet Eng'g Task Force, RFC 8179, May 2017), https://www.rfc-editor.org/rfc8179.txt; World Wide Web Consortium, Patent Policy § 6.1 (Daniel J. Weitzner ed., Aug. 1, 2017) [hereinafter W3C Patent Policy], https://www.w3.org/Consortium/Patent-Policy-20170801/; Advanced Television Sys. Comm., Inc., Doc. B/04, Patent Policy § 3 (Dec. 13, 2007) [hereinafter ATSC Patent Policy], https://www.atsc.org/wp-content/uploads/2016/06/B-4-2007-12-13_patent_policy_form_editable.pdf. ANSI directs that participants are "encouraged" to disclose standard-essential patents. Am. Nat'l Standards Inst., Essential Requirements: Due Process Requirements for American National Standards § 3.1, at 10 (Jan.

patents to provide assurances that they will grant licenses on a royalty-free or "fair, reasonable, and non-discriminatory" (FRAND) basis; failure to do so may result in disqualification from the organization or selection of alternate, noninfringing technology for the standard.[50] Finally, to avoid the possibility that licensing assurances become ineffective if the patent is assigned to a third party,[51] the organizations generally characterize licensing assurances as encumbrances that travel with the patent.[52]

2017) [hereinafter ANSI Requirements], *available at* https://www.ansi.org/essentialrequirements/. The USB and HDMI forums have no disclosure requirement because contributors must offer a blanket license to all essential patents.

[50] *See* W3C Patent Policy, *supra* note 49, § 3.1; *Lotes Co. v. Hon Hai Precision Indus. Co.*, 753 F.3d 395, 401 (2d Cir. 2014) (USB 3.0 Contributors Agreement requires "RAND-Zero" licenses); HDMI Forum, Inc., Bylaws annex C, § 1 (Oct. 25, 2011) [hereinafter HDMI Bylaws], http://hdmiforum.org/wp-content/uploads/2016/11/HDMI-Forum-Inc-Bylaws_Final_20111025.pdf (royalty-free licenses required); IEEE Bylaws, *supra* note 49, § 6.2, at 16–17 (FRAND licenses required); RFC 8179, *supra* note 49, § 5.5 (same); ATSC Patent Policy, *supra* note 49, § 1, at 1 (standardization of patented technology without FRAND agreement requires board-approved "exception" to general policy); Am. Nat'l Standards Inst., Guidelines for Implementation of the ANSI Patent Policy 8–9 (Jan. 2016), https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/ANSI%20Patent%20Policy%20Guidelines%202016.pdf (ANSI-certified standards require FRAND agreement); ITU Patent, *supra* note 49, at 90.

[51] *See* Nat'l Acad. of Scis., *supra* note 4, at 81; FTC-DOJ Report, *supra* note 47, at 6. Assignment of a patent to evade FRAND obligations may violate unfair competition law. *See* Complaint at ¶ 38, *In re Negotiated Data Solutions LLC*, No. C-4234 (Fed. Trade Comm'n Sept. 22, 2008); *In re Motorola Mobility LLC*, 156 F.T.C. 147, ¶ 28, at 154 (July 23, 2013).

[52] *See* IEEE Bylaws, *supra* note 49, § 6.2, at 17; RFC 8179, *supra* note 49, § 5.5(C), at 15; W3C Patent Policy, *supra* note 49, § 3.1 ("licensing obligations . . . encum-

Patent policies of standard-setting organizations further contain specific provisions such as timing of patent disclosures,[53] permissibility of seeking injunctive relief,[54] reciprocity in patent licensing,[55] committees for negotiating for licenses with non-participants,[56] and obligations arising from oral contributions to a standard.[57] This attention to detail demonstrates that when intellectual property rights affect implementation of a standard, the organizations make dedicated and extensive efforts toward private ordering of those rights.

C. The Lack of Parallel Copyright Policies Indicates that Standard-Setting Organizations Believe that Command Compilations Do Not Implicate Copyright

If contributors to a standard had a copyright interest in the command word compilations they contributed, one would expect standard-setting organizations to set forth at least reasonably detailed copyright licensing policies to protect

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ber the patents"); ITU Patent, *supra* note 49, at 91; ANSI Requirements, *supra* note 49, § 3.1.1(b) (assignor shall "ensure that the commitments in the assurance are binding on the transferee"); USB 3.0 Contributors Agreement § 3.5 (n.d.), *reprinted in* First Amended Complaint at Exh. A, *Lotes Co. v. Hon Hai Precision Indus. Co.*, No. 1:12-cv-7465 (S.D.N.Y. Dec. 21, 2012); HDMI Bylaws, *supra* note 50, annex C, § 1, at 2 (patent transfer "shall be subject to the terms and conditions of this IPR Policy").

[53] *See, e.g.,* ATSC Patent Policy, *supra* note 49, § 5, at 2.

[54] *See, e.g.,* IEEE Bylaws, *supra* note 49, § 6.2(b), at 17 ("reasonable terms and conditions" of FRAND license "precludes seeking, or seeking to enforce, a Prohibitive Order" generally); Nat'l Acad. of Scis., *supra* note 4, at 111–12.

[55] *See, e.g.,* USB 3.0 Contributors Agreement, *supra* note 52, § 3.4.

[56] *See, e.g.,* W3C Patent Policy, *supra* note 49, § 7.1.

[57] *See* RFC 8179, *supra* note 49, § 5.7, at 15.

implementers who must use those command word compilations. But standard-setting organizations almost uniformly lack copyright licensing policies: "As a generality, the issue of what might be referred to as 'essential copyrights' is rarely dealt in an effective way in IPR policies."[58] This suggests that copyright is simply not an issue with regard to implementing compilations of commands.

1. Most standard-setting organizations examined here have no relevant copyright policy at all. To the extent that a copyright license is sought from contributors to standards, the license is solely directed to distributing the text of the standard itself.

For example, ATSC requires contributors to its standards to grant the organization a license to "incorporate the Contribution into the Standard" and to copy the contribution as part of the standard, but ATSC demands no copyright license for implementation.[59] IEEE similarly requires no copyright license relevant to implementers.[60] Since the standards promulgated by these organizations all include compilations of multi-word commands,[61] the lack of policies addressing

[58] Rudi Bekkers & Andrew Updegrove, A Study of IPR Policies and Practices of a Representative Group of Standards Setting Organizations Worldwide 36 (Sept. 17, 2012) (commissioned paper preparatory to Nat'l Acad. of Scis., *supra* note 4).

[59] Advanced Television Sys. Comm., Inc., Doc. B/04, Operational Procedures for Technology Groups and Subcommittees §§ 15.1.1(i)–(ii), at 12 (Mar. 24, 2015), https://www.atsc.org/wp-content/uploads/2017/01/B-3-2015-03-24_Procedures.pdf.

[60] *See* IEEE Bylaws, *supra* note 49, §§ 7.2.1–.2.

[61] *See* Section I.B *supra* p. 6.

Organization	Patent Policy	Copyright Policy
IEEE	Yes	No
IETF	Yes	Only as of 2008; questionable
W3C	Yes	Only as of 2015
ATSC	Yes	No
ITU	Yes	Only for "software"
ISO, IEC	Yes	No
ANSI	Yes	Only for "normative software"
USB	Yes	No
HDMI	Yes	No

Figure 7: Standard-setting organizations' copyright policies with respect to implementation of standards.

copyright licensing suggests that the organizations did not believe that these compilations implicated copyright.

The copyright license agreements of the USB and HDMI forums are especially notable. Both require contributors to grant a copyright license to "prepare derivative works . . . in order to develop" drafts of the standard, but omit a derivative works license once the standard is final.[62] If implementation of a standard requires any copyright license at all, it must be a license to make derivative works. Inclusion of a derivative works license for drafting the standard but exclusion of a derivation license for using the final standard indicates, *expressio unius est exclusio alterius*, that contributors to USB and HDMI grant no copyright license applicable to implementation of final standards. Presumably no copyright license is sought because none is believed necessary.

2. Some standard-setting organizations do request copyright licenses permitting use of literal software code included in standards, but those licenses are inapplicable to command words. ITU (but not ISO and IEC) requires contributors of "Software," defined as instructions executable on a computer, to grant a copyright license on royalty-free or FRAND terms.[63] ANSI "strongly recommends"

[62]HDMI Bylaws, *supra* note 50, annex C, § 2; *see also* USB 3.0 Contributors Agreement, *supra* note 52, §§ 3.2–.3.

[63]*See* Int'l Telecomm. Union, Software Copyright Guidelines § 2.1 (3d ed. Dec. 7, 2011) [hereinafter ITU Copyright], *available at* https://www.itu.int/oth/T0404000004/en; *id.* annex A.

(but does not require) that accredited standard-setting organizations obtain copyright permissions "sufficient to ensure that there will be no legal impediment" to implementation of any standard that includes "normative software."[64]

Compilations of command words are not "software" for several reasons. First, both ANSI and ITU recommend developing standards "written around copyrighted material using performance-based requirements" rather than incorporating copyrighted software directly.[65] But command words in standards cannot be "written around"; exact wording of commands is the very essence of a standard.

Second, ITU distinguishes between executable software, which requires a license; and "data structures, data streams, [and] formal description techniques," for which, according to ITU, "no specific license is required."[66] Because command words are more akin to the latter category,[67] ITU likely interprets "software" not to include command words or compilations thereof.

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[64]Am. Nat'l Standards Inst., Guidelines on Software in Standards 3–4 (2008) [hereinafter ANSI Software Guidelines], https://share.ansi.org/Shared%20Documents/Standards%20Activities/American%20National%20Standards/Procedures,%20Guides,%20and%20Forms/ANSI%20Guidelines%20on%20Software%20in%20Standards.pdf.

[65]ITU Copyright, *supra* note 63, § 2.1, at 3; *accord* ANSI Software Guidelines, *supra* note 64, at 4.

[66]ITU Copyright, *supra* note 63, § 2.2.2, at 5.

[67]Command hierarchies are sometimes presented using formal description techniques such as Backus–Naur form. *See* P. Overell, Augmented BNF for Syntax Specifications: ABNF (D. Crocker ed., Internet Eng'g Task Force, RFC 5234, Jan. 2008), https://www.rfc-editor.org/rfc5234.txt.

Third, ANSI specifically expresses concern with the notion that use of a copyrighted work could be essential to a standard. Its copyright policy explains:

> If a standard requires that all implementers of the standard copy a specific copyrighted work, then by being endorsed as a standard, the copyright right has taken on a significance far beyond that which the original copyright right provided.[68]

If implementing a command compilation in a standard constitutes infringement of copyright, then every standard that contains a command compilation would require "that all implementers of the standard copy a specific copyrighted work," namely the command compilation. In such a case, copyright in commands will take on a significance far beyond what ANSI or other standard-setting organizations ever expected.

3. Two standard-setting organizations require contributors to provide a copyright license that arguably encompasses implementation of command word compilations. Both demonstrate the limited effectiveness of this approach.

W3C requires participants in its standard-setting processes to grant a copyright license such that "anyone may prepare and distribute derivative works . . . in software."[69] However, W3C's policy is only effective as of February 2015; prior

[68] ANSI Software Guidelines, *supra* note 64, at 4.

[69] World Wide Web Consortium, Document License (Feb. 1, 2015), https://www.w3.org/Consortium/Legal/2015/doc-license. That document is W3C's license granted to implementers; participants in W3C processes "must agree" that their submissions "will be subject to the W3C Document License." World Wide

to then it had no copyright policy for implementers at all.[70] Prior contributions to W3C standards, including Apple's contribution of command words to the CSS standard,[71] would have no attached copyright license for implementation.

IETF's policy is even less certain. The organization does require contributors to grant IETF a copyright license "to modify or prepare derivative works," which IETF could sublicense to implementers.[72] But the intent of that derivation license is not to protect implementers; it is to enable IETF to promulgate updated standards.[73] Indeed, IETF currently does not use its sublicensing ability to grant implementers any copyright license, except for a limited license on "Code Components" akin to the software licenses of ANSI and ITU.[74] And in any event, IETF's policy is only effective as of 2008, and IETF recognizes that no derivation

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Web Consortium, Process Document § 10.1.2 (Mar. 1, 2017), https://www.w3.org/2017/Process-20170301/.

[70] *See* World Wide Web Consortium, Document License (Dec. 31, 2002), https://www.w3.org/Consortium/Legal/2002/copyright-documents-20021231; *see also* Wendy Seltzer, *W3C Updates General Document License*, W3C Blog (Feb. 6, 2015), https://www.w3.org/blog/2015/02/w3c-updates-general-document-license/ (noting that updated W3C document license newly grants permissions for "implementing specifications").

[71] *See supra* p. 18.

[72] Rights Contributors Provide to the IETF Trust § 5.3(c), at 10 (S. Bradner & J. Contreras eds., Internet Eng'g Task Force, RFC 5378, Nov. 2008), https://www.rfc-editor.org/rfc5378.txt.

[73] *See id.* § 3.3, at 6–7.

[74] IETF Trust, Legal Provisions Relating to IETF Documents § 4(c) (5th ed. Mar. 25, 2015), https://trustee.ietf.org/documents/IETF-TLP-5_001.pdf; *cf. id.* § 3(d)(i) ("license to modify IETF Contributions or IETF Documents" is "*not* granted").

license was granted for pre-2008 contributions.[75] Again, the SMTP authentication command words described previously[76] were contributed in 2007 and have no attendant copyright license for implementation.

Every standard-setting organization reviewed above has a strong patent policy that stabilizes the obligations of implementers of standards. Not one has a comprehensive copyright policy protecting implementers in their use of command compilations in standards. The best inference from this discrepancy in treatment of intellectual property rights is that the standard-setting community does not believe that copyright licenses are necessary for implementing compilations of commands—because those compilations are not protected by copyright.

III. Patent Law Has Long Been Consistent with Industry Expectations in Technical Standard-Setting; Copyright Law Should Be as Well

On multiple occasions, this Court has recognized that technical standard-setting is a critical component of technological innovation, and has carefully weighed the settled expectations of the standardization community when interpreting patent law. Industry expectations ought to be taken into account in deciding this copyright case as well, especially given the uncertainty and risk to innovation that could result from a ruling contrary to industry expectations.

[75] *See id.* § 6(c).

[76] *See supra* p. 20.

1. Because they elicit product interoperability, positive network effects, and incentives for innovation, technical standards have "decidedly procompetitive effects."[77] This Court has drawn multiple doctrines of patent law to advance the arrangements of standard-setting organizations.

Damages. *Ericsson*, for example, directed courts assessing reasonable royalties to perform a special apportionment analysis for FRAND-encumbered patents, in order to avoid excessively high royalty awards that could cause holdup and thus "inhibit widespread adoption" of standards.[78] Indeed, to further protect adoption of standards, this Court later applied *Ericsson*'s apportionment analysis to all standard-essential patents, even those not under a FRAND obligation.[79]

Unenforceability. To ensure that standard-setting organizations' patent disclosure requirements are fulfilled, this Court has several times held that failure to disclose a relevant patent in the standard-setting process can constitute fraud potentially sanctionable by partial unenforceability of the patent.[80] Manifesting concern for preserving the expectations of standard-setting process members, this Court specifically held in *Qualcomm Inc. v. Broadcom Corp.* that even an oral

[77] *Princo Corp. v. Int'l Trade Comm'n*, 616 F.3d 1318, 1335 (Fed. Cir. 2010).

[78] 773 F.3d 1201, 1209, 1230–34 (Fed. Cir. 2014).

[79] *See Commonwealth Sci. & Indus. Research Org. v. Cisco Sys., Inc.*, 809 F.3d 1295, 1304–07 (Fed. Cir. 2015).

[80] *See Qualcomm Inc. v. Broadcom Corp.*, 548 F.3d 1004, 1026 (Fed. Cir. 2008); *Rambus Inc. v. Infineon Techs. AG*, 318 F.3d 1081, 1098 (Fed. Cir. 2003); *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d 1336, 1348 (Fed. Cir. 2011).

expectation among members may create an enforceable duty to disclose if "members treated it as imposing a disclosure duty."[81]

Injunctive Relief. Although an injunction is not *per se* unavailable for a FRAND-encumbered patent, *Apple Inc. v. Motorola, Inc.* observed that a patentee's "FRAND commitments are certainly criteria relevant to its entitlement to an injunction," among other reasons because "the public has an interest . . . in ensuring that SEPs [standard-essential patents] are not overvalued."[82]

2. Patent law has been interpreted mindful of the expectations of industry expectations regarding standard-setting, because to interpret patent law otherwise could seriously upset a critical component of technological innovation. Copyright law should also be interpreted mindful of the same expectations, for the same reason.

Standard-setting organizations generally lack copyright policies protecting implementers, as discussed above. To hold that implementation of a command compilation is indeed an infringement would potentially mean that contributors to standards (such as Apple, Netscape, Philips, and others noted in Section II.A) may hold a "standard-essential copyright," infringed by all implementers and unencumbered by any licensing obligation. The potential results include holdup

[81] *Qualcomm*, 548 F.3d at 1016.
[82] 757 F.3d 1286, 1332 (Fed. Cir. 2014).

based on copyright assertion, discouragement of adoption of existing standards, and ultimately a drag on standards-based innovation.

These economically damaging results need not obtain. Arista proffers sound theories that implementation of command word compilations is not an infringement of copyright; other *amici* do so as well. These interpretations of copyright law, besides being correct, would harmonize with industry expectations rather than upsetting them, and would ensure that the progress of science and useful arts continues undeterred.

CONCLUSION

For the foregoing reasons, this Court should affirm the judgment of the district court, and in particular hold the command word sequences at issue not subject to copyright protection.

Respectfully submitted,

Dated: December 23, 2017

/s/ Charles Duan

Charles Duan
Counsel of Record
Meredith F. Rose
Public Knowledge
1818 N Street NW, Suite 410
Washington, DC 20036
(202) 861-0020
cduan@publicknowledge.org
Counsel for amicus curiae

APPENDIX A
Table of Abbreviations

ANSI: American National Standards Institute
ATSC: Advanced Television Systems Committee
CSS: Cascading Style Sheets
DKIM: DomainKeys Identified Mail
DMARC: Domain-based Message Authentication, Reporting and Conformance
ESMTP: Extended SMTP
FRAND: Fair, Reasonable and Non-Discriminatory
HDCP: High-Definition Copy Protection
HDMI: High-Definition Multimedia Interface
IEC: International Electrotechnical Commission
IEEE: Institute of Electrical and Electronics Engineers
IETF: Internet Engineering Task Force
IPR: Intellectual property rights
ISO: International Organization for Standardization
ITU: International Telecommunication Union
MIME: Multipart Internet Mail Extensions
RFC: Request for Comment
SEP: Standard-essential patent
SMPTE: Society of Motion Picture and Television Engineers
SMTP: Simple Mail Transfer Protocol
SPF: Sender Policy Framework
USB: Universal Serial Bus
W3C: World Wide Web Consortium

CERTIFICATE OF COMPLIANCE

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Charles Duan
Counsel for amicus curiae

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I hereby certify that on December 23, 2017, I caused the foregoing **Brief of Public Knowledge as *Amicus Curiae* in Support of Defendant-Appellee** to be electronically filed with the Clerk of the Court using CM/ECF, which will automatically send email notification of such filing to all counsel of record.

Dated: December 23, 2017 */s/ Charles Duan*
Charles Duan
Counsel for amicus curiae