MARCH 2020

DEVOTED TO LEADERS IN THE INTELLECTUAL PROPERTY AND ENTERTAINMENT COMMUNITY

VOLUME 40 • NUMBER 3

THE Licensing Journal®

Edited by Gregory J. Battersby and Charles W. Grimes

Wolters Kluwer

Dawn of a New Era: Licensing and Standards in the Coming Age of 5G[1]

Christopher Smith and Adrian Cyhan

Christopher Smith is a shareholder in the metro Detroit office of Brooks Kushman P.C. He has over 14 years of patent litigation, licensing, and opinion experience. Chris advises clients on various licensing transactions, on both the licensor and licensee side of the negotiation. He has also represented corporations across a broad range of industries and technologies in various IP litigation disputes, including lawsuits involving patents, trademarks, trade secrets and copyrights, as well as post-grant proceedings at the PTAB.

Adrian Cyhan is a partner in the San Diego office of Dinsmore & Shohl LLP. He is a registered patent attorney with a practice focused on licensing and technology transactions, and providing strategic counsel with respect to identifying, protecting and leveraging intellectual property assets.

5G: What's the Big Deal?

The advent of 5G cellular wireless technology represents a major advance in speed and bandwidth of wireless communications. It will enable new and unprecedented networking and cloud capabilities to facilitate enhanced e-commerce, remote computing, and the analysis and use of big data. While the raw speed of 5G connections promises movie downloads in mere seconds, 5G's low latency will provide the lightning-fast communications needed for high-volume data applications such as industrial Internet of Things (IoT) and critical communications, virtual reality and gaming, autonomous and connected vehicle operation (*i.e.*, interfacing with other vehicles and infrastructure where communication and feedback delays are *critical*), as well as accessing and leveraging remote computing resources nearly instantaneously (such as for big data engines and artificial intelligence applications). Innovators will be able to harness the capabilities of 5G to power visionary and yet-unrealized developments, from smart and interconnected cities, to smart power grids, to applications of digital and telemedicine.

The Impact of 5G

There are many bold predictions regarding the transformational power of the 5G network. 5G is expected to offer speeds up to 100 times faster than current cellular connections. 5G networks will also feature higher capacity and greater responsiveness than current cellular technology.

There is little doubt that certain technology areas will benefit immediately from increased performance of 5G. Indeed, because there will be less latency in the network, 5G will enable advanced technologies to come to life and accelerate their performance, including autonomous vehicles and virtual and augmented reality across mobile networks. In this sense, 5G will be transformative, unlocking the potentials of use cases that we cannot even imagine.

One of the most significant advantages of 5G is that it will allow for the greater unification of mobile communication across the IoT. Everyday objects, from household appliances to vehicles, can use software and sensors to communicate among themselves and the cloud. Although the IoT today lives on the 4G network, many parts of the IoT will be included in the 5G networks and interconnected once 5G is widely (and reliably) implemented in a cost-effective way worldwide.

While 5G will undoubtedly offer greater speed, flexibility, and performance than 4G, the question is, *Do we need it*? Or better put, *Do we need it yet*? Indeed, many other applications do not necessarily require the digital horsepower that 5G affords. Connected appliances, thermostats, and other IoT products in the home are unlikely to require 5G's lightning fast speed. Some suppliers of these products will see the benefit of utilizing legacy technologies (*e.g.*, 3G, 4G) in the short-term to keep both component and licensing costs down, and 5G already allows specific applications with unique requirements to be served by the same infrastructure through *network slicing*.[2]

At least in the near term, however, 5G and 4G will coexist as part of a layered marketplace. Unlike past network upgrades, such as the transition from

3G to 4G, 5G is supplementing and being built on top of the 4G network, not replacing it. According to a report by Ericsson,[3] only 29% of mobile subscriptions worldwide will be 5G by 2025. In North America, GSMA Intelligence predicts that with about 47% of connections will be 5G and 44% will remain on 4G in 2025.[4] While Ericson predicts that by 2025 74% of subscriptions in North America will be 5G while the remaining 26% will be mainly made-up of LTE (4G).[5]

The Role of Standards in Unlocking 5G's Potential

At its essence, a "standard" is a norm, a rule, or an accepted way of doing something. Standards can arise through common practice or consensus, such as driving on the left side of the road, or use of the commonly-configured 3-prong power outlet. In addition, leading technologies and devices can emerge as de facto standards through market competition. Standards can be useful in providing consumer value, ensuring minimum quality levels, and enhancing public safety and welfare. The application of defined standards to various industries, technologies, and business endeavors is very common, such as the following: blockchain (IEEE); computer memory/DDR SDRAM (JEDEC); image and video coding (MPEG); audit (SOC); autos, trucks, aircraft (SAE); data protection and quality management (ISO); environmental/construction (LEEDS). As with prior generations of wireless communications, "standards" will play a key role in the development and advancement of foundational technologies for the deployment and utilization of 5G networks, as well as ensuring interoperability among their facilitators and users. In this realm, and for purposes of this discussion, standards comprise documents, established by consensus, which provide rules, guidelines, or characteristics for activities or their results (As defined in ISO/IEC Guide 2:2004).

The concept of interoperability has enabled widespread adoption of wireless cellular technology. In essence, interoperability in the wireless space means that devices from various manufacturers can communicate with each other over wireless networks and connections of different providers. Consumers greatly benefit from network effects: the more standardized technologies gain adoption, the more value users gain. These myriad interconnections are facilitated by common interface protocols among devices and networks as defined by standards. The development and application of relevant standards has evolved with wireless communications technology over time, as shown below:

As wireless technology evolved, standards for those technologies were developed or promulgated by relevant standardization organizations: standard-setting organizations ("SSOs") and standard development organizations ("SDOs"). While the terms SSO and SDO are often used interchangeably, there are material differences between these types of entities. Particularly in the wireless communications space, SSOs coordinate, codify, revise and otherwise maintain established practices or processes in the industry for interoperability purposes. (*e.g.*, the European Telecommunications Standards Institute, or "ETSI"; the Institute of Electrical and Electronics Engineers, or "IEEE"). On the other hand, SDOs focus on open, joint and collaborative development of complex technology standards through consensus among the SDO's participants, who can contribute technology and shape the standard with a focus on bringing the best technology to consumers, rather than addressing commercial terms and legal matters (*e.g.*, The Alliance for Telecommunications Industry Solutions, or ATIS; or the Telecommunications Industry Association, or "TIA").

Of course, SDO members who are innovators in the wireless space may also acquire patent rights for their contributions from patent systems throughout the world. Members who own patented technology may proffer the technology to SSOs, for inclusion in standards—such members are known as "contributors" in the standards ecosystem. A patent whose claims (or a subset thereof) are directed to technology that's incorporated into a standard—such that complying with or implementing the standard requires practicing the patented technology—is known as a "Standard Essential Patent," or "SEP." The incorporation of patented technology into standards raises an interesting tension: when relevant patented technology is incorporated into a standard by an SSO or SDO, how does the standard's broad adoption throughout the industry by manufacturers, distributors and sellers, otherwise known as "implementers" square with the time-honored rights of patent-owning "contributors" to recoup investment and profit from licensing patented technology? Ultimately, however, innovators and implementers both benefit form broad adoption of the standard. The concept of fair, reasonable and non-discriminatory" (*i.e.,* "F/RAND") licensing arose to solve this delicate balance between contributors and implementers.

	1G	2G	3G	4G	5G
Speed	2.4 kpbs	64 kpbs	2,000 kpbs	100,000 kpbs	>1 Gbps
Representative Characteristics, Applications	Basic Voice Analog protocols High energy usage / low battery life	Designed for voice; plus some data (SMS, MMS) Introduction of digital standards	Improved voice & data Mobile Internet Fixed wireless Internet Video calls	High speed High capacity Enhanced security Improved mobile web access Internet over IP Hi-def mobile video 3D TV Mobile videoconferencing Cloud computing	Higher speed Low latency Broadband cellular Machine-machine communications Internet of Things Autonomous vehicles (V to V, V to I)
Standards	AMPS TACS	GSM PDC CDMA GPRS (2.5G) EDGE (2.75G)	HSPA HSPA+	WiMAX LTE LTE-A	

	Standard Setting (SSO) (Model One)	*Standard Development (SDO) (Model Two)*
Process	Selection amongst known alternatives offered by contributors; choices serendipitous… no clear winner	New technologies developed, often at great expense to contributors. Standard adopted because it's of superior performance
Outcomes	Uniformity, compatibility	Innovation, uniformity, compatibility
Pricing	Usually zero (patents & trade secrets only rarely implicated)	FRAND (fair, reasonable and non-discriminatory)
Examples	Left- v Right-hand drive autos, SAE component; British v American electrical outlets	3G, 4G, LTE; 802.11 Wi-Fi (IEEE, ETSI)

Characteristics of SDOs and SSOs. From *https://businessinnovation.berkeley.edu/wp-content/uploads/2014/07/Tusher-Center-Working-Paper-No.-16.pdf*

How does F/RAND Licensing Stand to Impact the Coming Wave of 5G Technology?

The basic premise of licensing SEPs on F/RAND terms endeavors to ensure implementers' access to technology, while compensating contributors. F/RAND licensing also has the potential to eliminate so-called "hold-up" behavior by contributors. That is, without an obligation to license on F/RAND terms, a contributor may try to leverage a superior bargaining position with implementer-licensees, potentially blocking the standard. Such predatory licensing activity could stifle innovation and undermine the basis of SSO and SDO activity—collaborative development among innovators intended to identify and adopt superior alternatives for widespread benefit, for example, interoperability—because SSOs may be loath to adopt standards if contributors don't agree to license relevant SEPs in advance.

F/RAND obligations are governed by members of standardization organizations in connection with adopting standards, as well as by organizational bylaws or other governing documents and rules. Simply put, F/RAND obligations endeavor to provide access on fair terms to implementers who employ or operate under standards. That said, F/RAND licenses need not be identical among licensees, and may vary in view of particular circumstances, as would be expected (*e.g.*, cross-licensing vs. a single, one-way license). Indeed, courts throughout the world have determined ranges of F/RAND royalties, as shown in the table, below.

Venue	Determined rates	Basis for fee/damages	Applied to the average smartphone (€169, €210 and €240)	Average rate per patent
United Kingdom (*Unwired Planet v Huawei*)	0.064% (MM)* and 0.016% (CN)** product sales price	Two (MM) and one (CN) GSM SEPs*	€0.1082 (MM) and €0.027 (CN) per unit	€0.054 (MM) and €0.027 (CN)
	0.032% (MM) and 0.016% (CN) of product sales price	One UMTS SEP	€0.067 (MM) and €0.034 (CN) per unit	€0.067 (MM) and €0.034(CN)
	0.052% (MM) and 0.026% (CN) of product sales price	Five LTE SEPs	€0.125 (MM) and €0.062 (CN) per unit	€0.025 (MM) and €0.012 (CN)
US Eastern District of Texas (*Core Wireless v LG*)	$0.06 per unit	Two LTE SEPs	$0.06 per unit	$0.03
US Central District of California (*TCL v Ericsson*)	0.164% (United States), 0.118% (Europe) and 0.09% (rest of world) of product sales price	12 GSM SEPs	€0.277 to €0.152 per unit	€0.023 to €0.013
	0.3% (United States), 0.264% (Europe) and 0.224% (rest of world) of product sales price	20/25 UMTS SEPs	€0.63 to €0.47 per unit	€0.032 to €0.019
	0.45% (United States) and 0.314% (Europe and rest of world) of product sales price	70/112 LTE SEPs	€1.08 to €0.754 per unit	€0.015 to €0.007
Netherlands (*Philips v Archos*)	$0.75 per unit	55 UMTS SEPs and 42 LTE SEPs	$0.75 per unit	$0.008
Japan (*Samsung v Apple*)	0.00945% of product sales price	One UMTS SEP	€0.02 per unit	€0.02

*MM = Major markets

**CN = China and other markets

Awarded SEP royalties and their SEP bases. Source: Industry report - FRAND royalty and mobile telecoms SEPs – an analysis of recent court cases, 21MAR2018; *https://www.iam-media.com/frand-royalty-and-mobile-telecoms-seps-analysis-recent-court-cases* (accessed 03MAR2020).

In addition, while SEPs cover the technologies required to comply with or implement a promulgated standard, essentiality of a patent is self-declared by the contributor—*i.e.*, there is no official mechanism to review or determine the essentiality of a patent or patent portfolio (this is discussed in greater detail below, along with SEP valuation considerations). This is because declarations arose out of the necessity for an SDO to ensure that relevant standards would not be blocked, and development work can continue—declarations were not intended to be used as a licensing tool. In fact, however, essentiality determinations raise befuddling practical questions, such as whether adherence to a standard, by a standard-compliant device or method, means practicing the relevant patent claims.

Moreover, as to enforcement of F/RAND obligations, F/RAND licenses may confer third-party beneficiary status on implementers (although the law is still evolving and this is not uniformly applied). This affords implementers a breach of contract action (arguably subject to state law) against SEP holders who violate F/RAND obligations. That said, disputes over compliance with F/RAND obligations may also arise and develop as infringement actions. On the other hand, regarding contributor remedies, while the use of injunctions had been trending down (*see, e.g., Microsoft Corp. v. Motorola, Inc*., 696 F.3d 872 (9th Cir. 2012; F/RAND obligations requiring offer of license terms precluded injunctive relief), the U.S. Patent & Trademark Office recently adopted a new policy and endorsed the U.S. Department of Justice's perspective that SEPs should be treated the same as other patents, and that all remedies, *including injunctions*, should be available to SEP owners depending on the facts of the case.[6] While the results of this policy remain to be seen, increased threat of an injunction would seem to minimize temptation for implementers to "fly under the radar" until they are discovered. It will be interesting to observe the further evolution and development of such considerations in the courts.

A Word about Negotiations and Planning to Manage Disputes Over 5G Technology

Before the parties to a potential licensing agreement reach the finish line, certain planning and negotiating considerations should be addressed. For example, contributors of SEPs and implementers would be well-served to consider how confidentiality restrictions and arbitration may impact one-on-one negotiations, as well as the standards ecosystem at large (what becomes customary in the ecosystem may not be ideal for all participants). While contributors and implementers may wish to keep agreement terms confidential, there is a tension with a public benefit in the openness of certain terms. That is, a standards ecosystem may function more robustly and efficiently, and provide benefits to all participants, as well as to end users of products employing subject technologies, if certain terms are widely known. For example, time and resource-consuming litigation (a potential drag on innovation) could potentially be avoided and agreements could be more swiftly concluded if certain terms are non-confidential.

Arbitration may also be considered as a more efficient and economical dispute-resolution mechanism, especially by reducing uncertainty and costs compared to litigation in multiple jurisdictions. However, turning again to confidentiality, if a license agreement between a contributor and an implementer requires arbitration, and the terms of similar deals involving third parties and concerning the relevant technology are confidential, absent intervention from a court the arbitrators may not have access to highly-relevant "comparables" or other agreement terms to assess the "fairness," or at least the "reasonableness," and "non-discrimination" of a proposed royalty rate. In such circumstances, a potential workaround, depending on the parties' experience and sophistication, may be specify "baseball"-style arbitration. With respect to confidentiality and dispute resolution, there is no "one-size-fits all," and participants in standards ecosystems would be wise to consider the pros and cons of the various options for negotiating and resolving F/RAND disputes.

To address some of these concerns, increase clarity potentially expedite licensing of wireless technologies, especially in early stages of negotiation, certain parties have taken the lead in publishing royalty rates for wireless communications technology. For example, Via Licensing Corporation publicizes license fees for mobile phone- and tablet-relevant technology at *https://www.via-corp.com/licensing/long-term-evolution-lte/lte-license-fees*. Avanci posts license prices for F/RAND licensing of 2G, 3G, and 4G essential patents at *http://avanci.com/pricing/*.

The F/RAND Rate: Consideration for 5G

Although 5G technology is in its relative infancy, it is expected to expand rapidly over the coming years. The 2019 Ericsson Mobility Report predicts

that by 2025, "5G networks will carry nearly half of the world's mobile data traffic," and 5G has the potential to cover up to "65 percent of the world's population."[7]

Today, 5G is leading to a wave of innovation, with companies racing to develop new products and technologies that will take advantage of the greater speed, responsiveness, and connectivity that the fifth generation of wireless technology offers. As discussed above, 5G, however, will not immediately usher in a radical transformation from the current 4G wireless framework. As 5G continues to emerge, 4G performance will likewise evolve with increased functionality. For example, AT&T is calling its existing 4G LTE network "5G Evolution," which the wireless provider claims enables speeds up to "2x faster than standard LTE."

Companies who plan to build products that rely on 5G connectivity, however, will be forced to reckon with those who are building (and patenting) the 5G technology infrastructure, such as Huawei and Nokia. Many different technological components will need to be incorporated into products in order to take advantage of 5G connectivity. For example, 5G-connected vehicles will require various forms of chips, sensors, and software to implement the 5G standard. Such 5G technology is subject to various patent rights held by numerous entities. As has already been the case for 4G technology, 5G technology will likely introduce the need for implementers to negotiate and enter into additional licensing agreements covering 5G or risk being dragged into legal disputes with the owners of 5G technology.

Like what has historically occurred for 4G technology, potential licensors and licensees will have to navigate the complex arena of establishing appropriate F/RAND terms for 5G technology. Any such negotiation is apt to begin with a debate about the appropriate royalty rate. Indeed, an issue of frequent dispute—and litigation—among patent licensors and licensees is whether a patent owner may license its SEPs based on the sales price of the end-product, or the sales price of a component within that end-product. SEP owners typically seek a royalty rate based on the perceived value of the technology as realized through the sales price of the end-product—such as a 5G-connected vehicle—rather than the lower-priced connectivity components incorporated into the vehicle.

On the other hand, potential licensees can be expected to seek a royalty rate based on the components, which perform the wireless connectivity functions claimed in the relevant SEPs. This methodology seeks to determine the smallest salable patent practicing unit ("SSPPU") of the patented technology and limit the economic base from which damages are calculated to the smallest unit or component that practices the claims of the patent, a method adopted by the Federal Circuit on several occasions.[8] In other cases, the Federal Circuit has indicated that a patent damages calculation need not always begin with the SSPPU.[9,10]

In the world of Standard Essential Patents, courts have differed on how to calculate F/RAND rates. For example, in *HTC Corp. v. Ericsson Inc.*, the Eastern District of Texas held that the royalty calculation included more than the value of the baseband processor implementing the claimed cellular subject matter (SSPPU) but also included the value customers are willing to pay for the cellular functionality resulting from use of the claimed subject matter in the smartphone.[11] On the other hand, in *Federal Trade Commission v. Qualcomm Inc.*, the Northern District of California held that Qualcomm was "not entitled to a royalty on the entire handset," and that such a finding to the contrary "is inconsistent with *VirnetX* and Federal Circuit law on the smallest saleable patent practicing unit."[12,13]

This debate will surely carry over into licensing negotiations for 5G technology. As both district and appellate courts weigh in on the appropriate methodology to determine the F/RAND rate, there, however, is hope that more certainty will be introduced to the process—paving a path for licensors and licensees of SEPs to negotiate market-appropriate F/RAND rates for 5G patented technology.

What's Essential? Adding Clarity to 5G Negotiations

The vast majority of "declared" 5G standard essential patents are owned by a relatively small number companies.[14] Although the number of companies, which have "declared" ownership of the SEP's associated with 5G is limited, licensees face a challenge in knowing whether any particular "declared" technology is, in fact, "essential" to the 5G technological standard. Because there are high rewards (streams of royalty payments) and little oversight (standardization organizations are unregulated and generally don't assess whether patents are actually standard-essential), structural incentives spurring SEP owners to over-declaration patents as essential exist within the system. Indeed, in the current system patent owners are asked to declare a patent "essential" only to represent that the patent owner will not assert its

rights and block the development of the standard. By declaring a patent "essential," SEP owners, however, are able to increase the number of "essential" patents in their portfolio, which can appear to the outside world to bolster the SEP owner's contribution to the standard. In reality, a declaration of essentiality, however, does not necessarily mean that the declared patent represents any significant contribution to the standard.

This concern of perception versus reality has arisen in previous technology standards. For example, in the 4G realm, analysis comparing declared patents to standards to determine their essentiality have found that a significant number of "declared" patents only partially match the standard or don't match the standard at all.[15] One study found only 56% of analyzed patents matched the standard (*i.e.*, were essential) while 29% partially matched the standard and the remaining 15% did not match the standard.[16] Hence, would-be licensees can face ambiguity about the essentiality of technologies for which they are offered licenses. Such concerns remain a roadblock to potential licensees' willingness to agree to licensing terms for 5G technology.

One proposed remedy to this problem is to task governmental agencies such as the USPTO or EPO, or private bodies such as ETSI, with the job of analyzing patents to determine their essentiality.[17] Under such a proposal, the analyzing body—for a fee—would perform a secondary level of examination on the candidate-patent to determine if the claims match the standard. If deemed a match, the patent would receive a certification attesting to its essentiality.

Of course, there are concerns with involving a government agency or standard-setting organization in making qualitative judgements in the SEP process—in particular, the process of determining which patents are standard-essential would become more protracted and expensive. Determinations about who is responsible for paying for the process, and what appeal mechanisms would be available, would also have to be made.

Although this would add costs and complexity to the system, the benefits, to both licensors and licensees, may be worth it. A more formalized, predictable, and reliable certification process may result in higher royalties for licensors of certified SEPs, and licensees may be willing to pay a premium for greater certainty about the essential nature of what they are licensing. Regardless, one important hurdle to clear as we move into the world of 5G (and 5G Licensing) is how best to assure both sides of the bargain that the technology being licensed is truly "essential" to the 5G Standard.

SEP Pools and Their Potential Impact on 5G Licensing

As discussed above, multiple entities own the rights to SEP's involving 5G technology. Hence, taking a license from any one of those companies leaves a licensee potentially exposed to demands from other SEP owners. This uncertainty often prevents implementers from becoming willing licensees of the wireless technology. Indeed, little progress and innovation will occur in the 5G marketplace, or in other areas of technology that require adherence to a standard, if prospective licensees are saddled with the task of tracking down all the necessary patent holders in order to negotiate one-off licenses with each of them.

To address these challenges, SEP owners have historically created "patent pools," which aggregate essential patent rights related to a technological standard and allow licensees to acquire the intellectual property rights they need from a single source. For example, in the 4G space, Avanci is a patent pooling manager that licenses SEPs for products and applications that use 4G and earlier technology. In the automotive space, Avanci publishes the following rates: (1) $15/vehicle (4G—including 2G/3G and eCall); (2) $9/vehicle (3G—including 2G and eCall); and $3/vehicle (eCall only).[18] Licensors and licensees, alike, stand to benefit from patent pools because they can help reduce the time and transaction costs required in the licensing process. A potential licensee can take a license from a patent pool with added confidence that another SEP owner will not pop-up the next day with a new demand. And licensors can avoid the hassle associated with individually approaching SEP implementers about taking licenses.

In practice, patent pools, however, are not always the perfect solution. Indeed, while many, or even most, of the primary SEP owners participate in such pools, not necessarily all the SEP owners are members. In the case of Avanci, companies such as Google, Samsung, Huawei, and other large SEP owners are not part of the patent pool. Accordingly, despite the existence of patent pools, licensees may still need to license patents that are outside the pool. Even with these potential shortcomings, it, however, can be expected that pooling organizations—such as Avanci—will continue to provide aggregated licensing options for 5G technology. And as these pooling organizations are able to grow to include the primary SEP owners, the ability to one-stop shop for 5G licenses will likely become a more accepted practice.

Thus, as the advent of 5G technology heralds a vast new era of technological development with

potentially profound economic and societal benefit, significant questions arise as to strategies and practices to fairly align incentives and maximize benefits. Only time will tell whether tweaks to existing methods will prove adequate, or whether they will be supplanted by novel and radically different approaches.

1. *The authors sincerely thank Matteo Sabattini, Ph.D., MBA, Director IP Policy, Ericsson, for sharing his time and thoughtful insights regarding the topics covered in this article.*
2. "5G Network Slicing Whitepaper," FCC Technological Advisory Council: *https://transition.fcc.gov/bureaus/oet/tac/tacdocs/reports/2018/5G-Network-Slicing-Whitepaper-Finalv80.pdf*.
3. *See https://www.ericsson.com/4acd7e/assets/local/mobility-report/documents/2019/emr-november-2019.pdf*.
4. *See https://www.gsmaintelligence.com/research/?file=b9a6e6202ee1d5f787cfebb95d3639c5&download*.
5. *See https://www.ericsson.com/4acd7e/assets/local/mobility-report/documents/2019/emr-november-2019.pdf*.
6. New Injunction Policy Boosts Power Of Essential Patents; Law360, *https://www.law360.com/articles/1232895/new-injunction-policy-boosts-power-of-essential-patents?nl_pk=e798e701-b0bd-4974-bd75-501e920038d1&utm_source=newsletter&utm_medium=email&utm_campaign=special*.
7. *See https://www.ericsson.com/4acd7e/assets/local/mobility-report/documents/2019/emr-november-2019.pdf*.
8. LaserDynamics, *Inc v Quanta Computer, Inc.*, 694 F.3d 51 (Fed. Cir. 2012); *Virnetx, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1327 (Fed. Cir. 2014).
9. 809 F.3d 1295, 1303 (Fed. Cir. 2015).
10. 2018 U.S. App. LEXIS 783 (Fed. Cir. Jan. 12, 2018).
11. *HTC Corp. et al. v.Telefonaktiebolaget LM Ericsson. et al.*, Case No. 6:18-cv-00243-JRG, at *8–11 (E.D. Tex. May 23, 2019).
12. *Fed. Trade Comm'n v. Qualcomm Inc.*, Case No. 5:17-cv-00220-LHK, at *172–173 (N.D. Cal. May 21, 2019).
13. An appeal of this decision is currently pending before the 9th Circuit Court of Appeals. Several SEP patent owners submitted briefing arguing that the district court erred. (*https://www.ca9.uscourts.gov/content/view.php?pk_id=0000001003*).
14. *https://www.iam-media.com/who-will-be-technology-leader-5g-part-one*.
15. *https://www.cybersoken.com/file/lte03EN.pdf*.
16. *Id.* at 19.
17. *https://www.iam-media.com/frandseps/millien-epo-seps*.
18. *http://avanci.com/*.