

Open standards: together we innovate

IPR and FRAND licensing driving high performance connectivity for all

In brief: fueling global innovation

A balanced framework for standardization is key to incentivize R&D and innovation and stimulate the investments needed to achieve seamless global connectivity. Indeed, by 2020 the mobile industry alone is expected to have invested USD 4 trillion in R&D and capital expenditure to meet the expected demand in connectivity.[1]

To develop the next generation of technology for 5G and the Internet of Things (IoT), it is vital that incentives to innovate and contribute to standardization continue to be encouraged rather than weakened. Reducing incentives to innovate will likely have a direct impact on the economic potential of this profound digital transformation.

In this paper, we make the following key points:

1. ICT standards are “development standards” rather than mere “interoperability standards”. Standardization within standard development organizations (SDOs) like ETSI and ITU involves the setting of certain product requirements (e.g. for consumer safety or environmental protection) on top of the actual development of cutting-edge technologies. Cellular standards such as 4G/LTE and 5G/NR are thus not only set, but also developed from the ground up, becoming complete technical blueprints that can be used without further R&D. These standards are created based on technology voluntarily contributed by companies like Ericsson.

2. Within the telecom and ICT industries, patents play an important role in standardization by allowing innovative companies to share ideas and actual technology on fair and reasonable terms – that is, with the understanding that



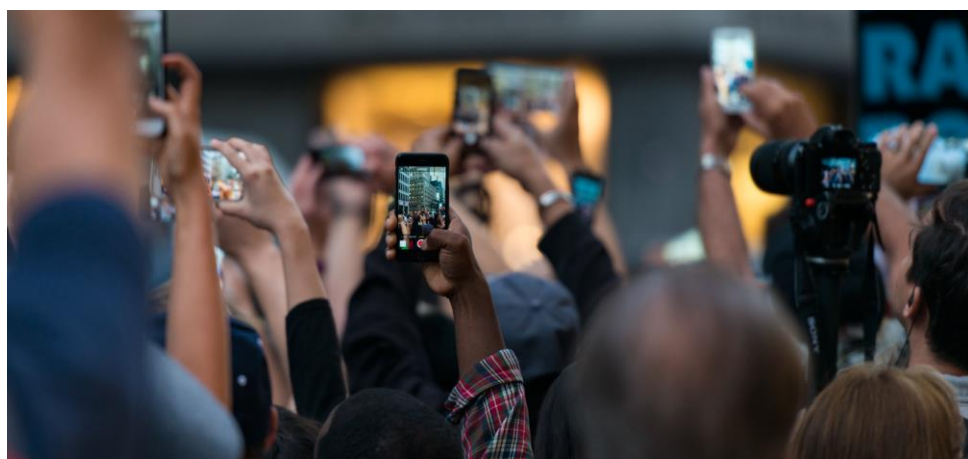
those who make use of it will agree to compensate innovators for their investments. This allows SDOs to attract the best technologies to their standards. Where a solution adopted as part of a standard is also patented, the patent is said to be a Standard Essential Patent.

3. At Ericsson, we are committed to the FRAND system of licensing Standard Essential Patents. The FRAND commitment requires Standard Essential Patent owners to offer access to the standardized technology they own on fair, reasonable and non-discriminatory terms.[2] This system has been widely used within the telecom sector for over two decades and the vast majority of licensing negotiations have been successfully concluded, which is a sign that the system works.

4. The current FRAND system strikes an important but delicate balance between technology contributors and technology users. Further policy initiatives in this field should not undermine incentives for technology developers to invest in open and standardized technology. Likewise, they should not encourage a shift toward proprietary technologies that could threaten interoperability between equipment from different vendors, leading to user lock-in and reduced consumer choice.

5. Successful 5G and IoT standards will require a tremendous amount of investment, engineering expertise and the capital-intensive, years-long development of cutting-edge technologies. An open, transparent, consensus-based, and balanced standardization framework is needed to ensure that the broadest possible base of companies contribute technology to these standards, and that an even larger group of companies are willing to implement them in their products.

Seamless connectivity



Global standards are fundamental to today's ubiquitous connectivity. Historically, there was no uniformity between the telecommunication technologies that were



adopted by different countries, continents, and regions. In order to help improve interoperability, different companies participated and over time helped create globally standardized communication technologies. These technologies ensure end-to-end system performance and worldwide interoperability between networks, devices, and network operators.

In addition, telecommunication standards have evolved beyond pure interoperability solutions and today enable global and dynamic ecosystems. It is against this background that Ericsson envisages a world where billions of people and devices will be seamlessly connected. This will require high-performing and secure technology standards for 5G communications and IoT, which will be developed by innovative companies within standard-developing organizations like ETSI[3] and ITU.[4]

Looking to the future, we foresee an even more connected world, with 30 billion connected devices expected by 2023.[5] To meet the need for better networks and greater capability, Ericsson has invested approximately EUR 11 billion in research and development over the past 3 years and currently devotes more than 23,600 employees to R&D, much of which is focused on contributing to open standards for telecommunications.

In this paper, we describe how standardization of wireless telecoms and FRAND licensing of Standard Essential Patents typically work. We aim to explain and highlight some important aspects and challenges of standardization and FRAND patent licensing.

The creation and evolution of open cellular standards

Wireless cellular standards – such as GSM, which was developed in Europe – have proven to be highly successful on a global scale. Indeed, the mobile wireless industry has enjoyed remarkable growth in the last two decades, providing affordable communication that today connects more than 5 billion unique subscribers[6] at decreasing prices. For instance, the average mobile subscriber cost per megabyte decreased by 99 percent between 2005 and 2013, while data-transmission speeds increased by a factor of 12,000 when comparing 2G and 4G technology.[7]

Wireless cellular standards are highly complex and intended to perform and improve over many decades. This means that devices and network equipment are enhanced by continuously improved standardized technologies, generating better end-to-end performance and superior features for industry and consumers. This has, among others, enabled the development of intelligent transport systems providing real-time updates to passengers; remote healthcare solutions that help doctors diagnose patients on the other side of the world; and online education



platforms which can reach remote areas via mobile telecommunication (thereby compensating for a lack of available qualified teachers). We are already seeing this expand to self-driving cars, smart cities, and e-health applications such as tactile robotic surgery[8], and much more.

At the heart of this success lie the standards for global wireless communication systems developed within SDOs such as ETSI and ITU. Creating new standards involves many different stakeholders, such as network and terminal equipment vendors, service providers and research institutes.

It requires multiple steps, including setting performance requirements (what is the need?), identifying technical problems to solve (what is required to fulfill this need?), researching and proposing solutions, and finally selecting one solution based on the best technology for each technical problem (what technical solution can best meet these requirements?). This highly competitive process is continuously repeated as more functionality is added to the standard over time, benefiting the whole ecosystem. At the end of 2017, the first version of the radio parts of 5G (i.e. New Radio (NR) in 3GPP) was published, heralding the beginning of a new era for mobile communication.

The value of open standards for ICT

In the telecommunication industry, open cellular standards have ensured the evolution of mobile wireless technology and have been a constant driver of innovation:

- 1.** Global cellular standards create global ecosystems by enabling economies of scale which lead to lower implementation costs. They have become an engine for economic growth in virtually all sectors that benefit from connectivity.
- 2.** Open standards enable companies to use the technology included in the standards and innovate on top of an already existing ecosystem (even though they were not involved in developing the standard).[9]
- 3.** The open standardization process ensures contributions from many different stakeholders, and creates well-engineered specifications based on future-proof cutting-edge technology.
- 4.** Cellular standards enable multi-vendor interoperability: operator networks are often comprised of products supplied by different parties and they support mobile phones and other connected devices from many different vendors.
- 5.** Standards allow companies to bring their products to market faster, thereby capturing the market window. This fast market access is important in the telecom and ICT industries, where technologies are constantly evolving and changing.



Fair incentive for innovators

Fair, reasonable and non-discriminatory (FRAND) licensing

Within the telecom and ICT industries, patents play an important role in standardization by enabling innovative companies to share both ideas and technology as early as possible on fair and reasonable terms – that is, with the understanding that those who make use of it will agree to compensate the innovators for their investments. Where a solution adopted as part of a standard is also patented, the patent is said to be a Standard Essential Patent.[10]

Holders of Standard Essential Patents commit to making standardized technology accessible to the market on FRAND terms. The FRAND system is a delicate balancing act in which SDOs seek to obtain the best technology, encouraging participation by innovators while creating reasonable conditions for commercial implementation by licensees and implementers.

In short, the FRAND commitment means that (i) the adoption of the standard cannot be blocked (since Standard Essential Patent holders agree to restrict some of their normal patent rights, i.e. their right to block/exclude others that accept to be bound by FRAND terms); and (ii) it provides those who contribute technology to standards with a return on their investments (in order to incentivize continuous investment in further development of open standards).

This licensing framework ensures the market becomes accessible to new players who want to use standardized technology to launch new products without any prior investment in the relevant R&D. Some very well-known examples of companies that grew substantially through the use of existing standards to which they did not initially contribute are Samsung (Korea), Huawei (China), HTC (Taiwan), BlackBerry (Canada) and Apple (USA).

FRAND licensing is a collaborative success story driving growth and innovation in 5G and IoT

The current FRAND system has been widely used within the telecommunications sector for more than two decades. The strongest technology standards empowering today's cutting-edge technologies – 3G and 4G/LTE mobile communications, Wi-Fi and others – were all fostered by today's widely used collaboration framework.

The increased media attention on some disputes does not change the fact that in the telecommunication industry as a whole, this licensing framework has encouraged competition, created wide choices for consumers, and helped to reduce prices and improve product quality. At the same time, it provides an environment where SMEs have access to new technologies. In fact, in light of the enormous size of the telecommunication industry, the limited number of existing disputes (between only a few players in that industry) can be considered a sign of a healthy and competitive ecosystem.



In addition, it should be noted that although the vast majority of user products put on the market are indeed covered by relevant Standard Essential Patent licenses, there are companies that actively try to avoid (or delay) licensing discussions. This situation is typically referred to as “patent hold-out” and has become commonplace among companies seeking to free-ride on others’ R&D investments. As a result, these companies are able to sell their products at unfairly low prices, or alternatively enjoy unduly high profit margins compared to their licensed competitors present in the same market.[11]

When confronted with a company that uses its patents but refuses to accept a license, a patent holder needs to be able to protect its intellectual property. In these cases, recourse to injunctive relief is generally a legitimate remedy, as without it unwilling licensees have no or very little incentive to enter into licenses (instead being encouraged to force patent holders into starting litigation). This would place a disproportionate and excessive burden on the latter and would trigger a substantial devaluation of Standard Essential Patents.

The importance of a fair balance in this type of licensing negotiation has been acknowledged by the Court of Justice of the European Union (CJEU) in its landmark Huawei/ZTE ruling.[12] Firstly, the CJEU has clarified that FRAND is a two-way street, i.e. not only the licensor but also the licensee has to act in good faith. Secondly, the Court has provided clear guidelines to determine, on a case-by-case basis, (i) whether the alleged infringer has showed its willingness to obtain a FRAND license (thereby avoiding an injunction); and (ii) the circumstances and parameters in which it is acceptable for patent holders to resort to injunctive relief when faced with an unwilling licensee.

Case study

The new IEEE patent policy

In 2015, after a controversial, closed and disputed process, the Institute of Electrical and Electronics Engineers (IEEE) responsible, inter alia, for the Wi-Fi standard, changed its patent policy in a way that significantly disfavored technology contributors.

In short, the new policy makes it practically impossible for holders of Standard Essential Patents to seek judicial injunctions against licensees who refuse to enter into (or who unduly delay) licensing negotiations. It also introduces a unique calculation method which results in an exponential reduction of any royalty amount due by licensees.[13] Finally, it precludes Standard Essential Patent holders’ freedom to choose at which level in the value chain to negotiate a license (which is important, among other reasons, for minimizing transaction costs).



The new policy therefore removes any incentive for licensees to come to the negotiating table in good faith and makes it extremely difficult to enforce patents that are included in IEEE standards. This has started to undermine the equilibrium between technology developers and users that originally allowed standardization to flourish: two years after its introduction, the new policy has already led to a slowdown of standards development at IEEE and to major uncertainties regarding future standard development within this SDO, as major technology contributors are unable to provide assurances that they will grant access to their patented technology under the new policy.[14]

IEEE and those who benefit from it the most, i.e. technology buyers, are nevertheless aggressively promoting the new policy worldwide. It should be noted that successful standardization inevitably leads to a majority of standard users and a minority of technology contributors, as typically the foundation of the standardization effort is laid by a relatively small group of innovators (i.e. those willing to contribute the result of their own R&D efforts to the creation of a standard). The result is that there are more voices from users of the standards than there are from contributors to the standard: the more successful the standard becomes, the more its creators become part of a minority in these discussions.

If the new IEEE policy takes effect globally, it will risk favoring the consolidation of proprietary, non-standardized and non-interoperable ecosystems. The lack of interoperability between systems and products will favor only a few dominant companies, raise prices and ultimately reduce consumer choice.

Conclusion

It's all in the balance

With more than 30 years' experience as a leading contributor to open standards and more than 49,000 granted patents, we have one of the industry's strongest patent portfolios.

In this paper we have seen that a balanced framework for standardization is a necessary element to incentivize R&D and innovation and stimulate investments needed to achieve a seamlessly connected global network.

To continue developing next-generation technology and the digital transformation, Ericsson puts forward the following key concepts:

1. ICT standards are "development standards" rather than mere "interoperability standards". Standardization involves not only the setting of certain product



requirements but also the actual development of cutting-edge technologies.

2. Within the telecom and ICT industries, patents play an important role in standardization by allowing innovative companies to share ideas and actual technology on fair and reasonable terms.

3. FRAND commitment requires Standard Essential Patent owners to offer access to the standardized technology they own on FRAND terms. FRAND has been used within the telecom sector for over two decades and the vast majority of licensing negotiations have been successfully concluded.

4. The current FRAND system strikes a balance between technology contributors and technology users. Further policy initiatives should not undermine incentives for technology developers nor should they encourage a shift toward proprietary technologies that could threaten interoperability.

5. An open, transparent, consensus-based, and balanced standardization framework is needed to ensure that the broadest possible base of companies contribute technology to 5G and IoT standards, and that an even larger group of companies are willing to implement them in their products.

Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency, and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York.

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Annexure:

1 Source: Boston Consulting Group, "The Mobile Revolution", January 2015

2 Source: Boston Consulting Group, "The Mobile Revolution", January 2015. This includes the possibility of licensing on a royalty-free basis, as established by Regulation No 1025/2012 – see Annex II, 4c

3 European Telecommunications Standards Institute

4 International Telecommunications Union

5 Source: Ericsson Mobility Report, November 2017, www.ericsson.com/mobility-report

6 Source: www.gsmaintelligence.com/research/2018/02/the-mobile-economy-2018/660/

7 Source: The Boston Consulting Group, "The Mobile Revolution", January 2015

8 See "Ericsson and King's College London demonstrate 5G tactile robotic surgery" www.ericsson.com/news/2023409

9 3GPP (3rd Generation Partnership Project) standards are complete technology blueprints. 3GPP is a collaboration between groups of telecommunications associations for which the initial scope was to make a globally applicable third-generation (3G) mobile phone system specification. The scope was later enlarged to include the development of further cellular standards

10 In short, a Standard Essential Patent is a patent that covers technology elected by an SDO. Therefore, a product that is compatible with a standard must use the patent for that standard. For example, a mobile device that can connect to a 4G/LTE network will have to use technology (and thus Standard Essential Patents) that contributed to the LTE standard

11 This situation is much more common than the hypothetical patent "hold-up" situation, whereby a Standard Essential Patent holder uses their position to extract royalties higher than FRAND

12 Case C-170/13 Huawei Technologies Co. Ltd v ZTE Corp., ZTE Deutschland GmbH

13 Real-life example: Near Field Communication (NFC) is a standardized technology for contactless payments that replaces traditional credit cards and turns smartphone companies into banks with access to the purchasing history of their customers. The original NFC co-inventors are a 250-employee SME that invested significant resources over 10 years to develop the technology and contribute to the NFC standard. Without this large SME investment, NFC could not work. In order to break even, the co-inventor still needed to recover a significant part of their original investment via the licensing of their patented inventions.



Under the new IEEE rules, the return for 10 years of R&D investments by the SMEs that co-invented NCF is reduced by a factor of 30 to 50, with a reduction of potential return from between 100 and 200 million dollars to 2–7 million dollars

14 For the marked decline in letters of assurance for IEEE standards after the new policy was adopted see <http://bit.ly/IEEE-LOAs>; for evidence of the delay, chaos, and loss of momentum in IEEE technical standards development after the new policy was adopted see http://ieee802.org/minutes/2016_01/2016-01-22-minutes-v1.pdf at pp. 4-5